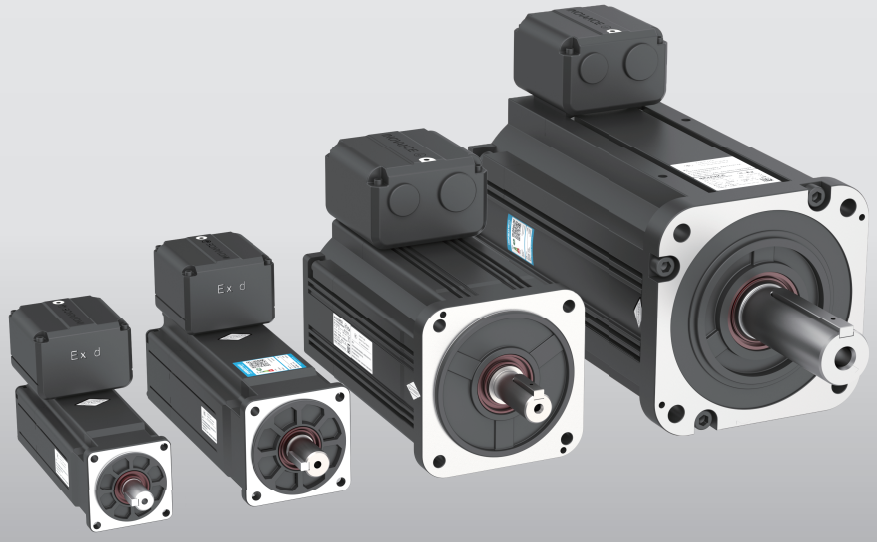
INOVANCE

Advancing industrial technology,
for a better world



MS1-R Series High-Performance Explosion-Protected Servo Motor

Selection Guide

Industrial Automation | Intelligent Elevator | New Energy Vehicle | Industrial Robot | Rail Transit

Data code PS00014314A01

Legal Information

Copyright

Copyright © Shenzhen Inovance Technology Co., Ltd. 2025 All rights reserved

This documentation is the exclusive property of Shenzhen Inovance Technology Co., Ltd.. No individual or entity may excerpt, reproduce, modify, translate, or distribute any content herein without written consent from Inovance.

Legal action will be taken against infringement.

Trademarks

INOVANCE is a registered trademark of Shenzhen Inovance Technology Co., Ltd. and its affiliates. All other trademarks or registered trademarks mentioned in this documentation are the property of their respective owners. Unauthorized use of these trademarks by third parties for any purpose without written authorization could violate the rights of their owners.

Disclaimer of Liability

Due to continuous updates and improvements of products and technologies, the content of this documentation may not fully match the actual products. In the event of any discrepancies, the actual products shall prevail.

The contents are subject to change without notice due to product upgrade.

Waste Disposal

The storage, use, and disposal of this product (including optional accessories) must comply with local laws and regulations.

Qualified Personnel

The product/system described in this documentation may be operated only by personnel qualified for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel can identify the risks of the product/system and prevent possible dangers.

Proper Use of the Product

Proper transportation, storage, assembly, installation, commissioning, operation, and maintenance are required to ensure the safe operation of the product without any problems. The required ambient conditions must be met. All operations must follow the guidelines provided in this documentation.

Preface

Introduction

Thank you for purchasing the MS1-R-EX d T4/T5 series servo motor.

The MS1-R-EX d T4/T5 servo motor is an explosion-protected motor with a power range of 0.2 kW to 7.5 kW and supports frame sizes 60 to 180.

It applies to automation equipment that used in industries requiring gas or dust explosion protection, such as printing, aerospace, fuel, and surface grinding, providing a safe and reliable operation environment. This user guide presents motor information, model selection, and motor wiring methods for MS1-R-EX d T4/T5 series servo motors.

Contact Inovance for detailed information on the motor function and performance.

Documents provided by Inovance are subject to change without notice due to continuous product improvement.

More Data

Name	Data code	Description
MS1-R Series High-Performance Explosion-Protected Servo Motor Selection Guide	PS00014314	Presents product information, general specifications, motor selection, cable selection, certification categories and standards of the product.
MS1-R Series High-Performance Explosion-Protected Servo Motor Installation Guide	PS00017335	Presents the installation of the motor, including motor installation flowcharts, wiring, unpacking and handling, mechanical installation, and electrical installation.

Revision History

Date	Version	Revision
Sept 2025	A01	• Updated *" SV660 Series" on page 67*. • Updated *" IS810N Series" on page 69*. • Updated *"5.1 Model Selection" on page 33* and heatsink derating curves.
March 2025	A00	Initial release.

Access to the Guide

This guide is not delivered with the product. You can download the PDF version in the following ways.

- Do keyword search under Service and Support at *www.inovance.com*.
- Scan the QR code on the product with your smart phone.
- Scan the QR code below to install My Inovance app, where you can search for and download user guides.

Questions about the user guide

- Contact us if you have any questions or suggestions for this user guide.
- The data and consistency of the contents in this user guide have been reviewed as required. However, deviation cannot be precluded entirely. The necessary revision will be made in the subsequent versions.

Table of Contents

Legal Information 1
Preface 1
1 Model Selection Instructions for Use in Explosive Atmospheres 6
2 List of Model Selection 9
3 Product Information 14
3.1 Product Characteristics 14
3.2 Model and Nameplate 15
3.3 Motor Components 17
3.4 Junction Box 18
4 Product Specifications 21
4.1 Mechanical Specifications 21
4.2 Overload Characteristics 23
4.3 Derating Characteristics 26
4.4 Operating Frequency 27
4.5 Carrier Frequency of the Drive 28
4.6 Temperature curve of the oil seal 29
4.7 Service Life of the Bearing 29
4.8 Load Moment of Inertia 29
4.9 PTC Temperature Control Module 30
4.10 Selecting Fasteners 32
5 Motor Selection 33
5.1 Model Selection 33
5.2 MS1H3 Motors with Medium Inertia and Medium Capacity 34
5.2.1 MS1H3-85B15CD-A33*R-EX d T5 34
5.2.2 MS1H3-85B15CD-T33*R-EX d T4 35
5.2.3 MS1H3-13C15CD-A33*R-EX d T5 36
5.2.4 MS1H3-13C15CD-T33*R-EX d T4 37
5.2.5 MS1H3-16C15CD-A33*R-EX d T5 38
5.2.6 MS1H3-18C15CD-A33*R-EX d T4 39
5.2.7 MS1H3-18C15CD-T33*R-EX d T4 40
5.2.8 MS1H3-29C15CD-A33*R-EX d T5 41
5.2.9 MS1H3-29C15CD-A33*R-EX d T4 42

5.2.10 MS1H3-29C15CD-T33*R-EX d T4 43
5.2.11 MS1H3-37C15CD-A33*R-EX d T5 44
5.2.12 MS1H3-44C15CD-A33*R-EX d T4 45
5.2.13 MS1H3-44C15CD-T33*R-EX d T4 46
5.2.14 MS1H3-45C15CD-A33*R-EX d T5 47
5.2.15 MS1H3-55C15CD-A33*R-EX d T4 48
5.2.16 MS1H3-55C15CD-T33*R-EX d T4 49
5.2.17 MS1H3-75C15CD-A33*R-EX d T4 50
5.2.18 MS1H3-75C15CD-T33*R-EX d T4 51
5.3 MS1H4 Motors with Medium Inertia and Small Capacity 52
5.3.1 MS1H4-20B30CB-A33*R-EX d T5 52
5.3.2 MS1H4-20B30CB-T33*R-EX d T4 53
5.3.3 MS1H4-40B30CB-A33*R-EX d T5 54
5.3.4 MS1H4-40B30CB-T33*R-EX d T4 55
5.3.5 MS1H4-55B30CB-A331R-EX d T5 56
5.3.6 MS1H4-55B30CB-T331R-EX d T4 57
5.3.7 MS1H4-75B30CB-A33*R-EX d T5 58
5.3.8 MS1H4-75B30CB-T33*R-EX d T4 59
5.3.9 MS1H4-90B30CB-A33*R-EX d T5 60
5.3.10 MS1H4-10C30CB-A33*R-EX d T4 61
5.3.11 MS1H4-10C30CB-T33*R-EX d T4 62
6 Cable Selection 64
6.1 Model Description 64
6.2 Cable Type 64
6.3 Recommended Cable Specifications 65
6.4 Cable Model List 67
6.4.1 SV670/SV660/SV630 Series 67
6.4.2 IS810N Series 69
6.5 Wiring of Terminals 71
6.5.1 Wiring Assignment of Motor Terminals 71
6.5.2 Installing the Motor Cables and Glands 72
7 Servo Motor Capacity Selection 79
7.1 Capacity Selection Example for Position Control 79
7.2 Capacity Selection Example for Speed Control 82
8 Standards Compliance 85
9 Service and Support 86

10 Appendix..... 87
10.1 CCC Certificate 87
10.2 Description of the Motor Enclosure Temperature 91

1 Model Selection Instructions for Use in Explosive Atmospheres

Class II equipment

Class II equipment is used in all the explosive gas atmospheres except the coal mine gas atmosphere.

Class II equipment can be further classified according to the characteristics of the intended explosive gas atmospheres as shown in the following table.

Equipment class	Representative gas
Class IIA	Propane
Class IIB	Ethylene
Class IIC	Hydrogen and acetylene

Class III equipment

Class III equipment is used in all the explosive dust atmospheres except coal mines.

Class III equipment can be further classified according to the characteristics of the intended explosive dust atmospheres.

Equipment class	Explosive dust atmospheres
Class IIIA	Combustible fibers
Class IIIB	Non-conductive dust
Class III C	Conductive dust

Explosive atmosphere zoning:

Zone	Description
Zone 0	An explosive atmosphere formed by combination of the air and combustible substances in the form of gas, vapor, or mist, which occurs continuously or frequently, or exists for a long period of time
Zone 1	An explosive atmosphere formed by combination of the air and combustible substances in the form of gas, vapor, or mist, which occurs occasionally during normal operation.
Zone 2	An explosive atmosphere formed by combination of the air and combustible substances in the form of gas, vapor, or mist, which does not occur during normal operation or occurs only for a short period of time
Zone 20	An explosive atmosphere formed by combustible dust cloud in the air, which occurs continuously or exists for a long period of time
Zone 21	An explosive atmosphere formed by combustible dust cloud in the air, which occurs occasionally during normal operation
Zone 22	An explosive atmosphere formed by combustible dust cloud in the air, which does not occur during normal operation or occurs only for a short period of time

Temperature class

Table 1–1 Maximum surface temperature class of class II equipment

Temperature class	Maximum surface temperature (℃)
T1	≤ 450
T2	≤ 300
T3	≤ 200
T4	≤ 135

Temperature class	Maximum surface temperature (℃)
T5	≤ 100
T6	≤ 85

Table 1–2 Zone indication and applicable equipment protection level (EPL)

Zone	Equipment protection level (EPL)
0	Ga
1	Ga, GB
2	Ga, GB, and Gc
20	Da
21	Da, Db
22	Da, Db, and Dc

Table 1–3 Relationship between the gas or vapor or dust classification and the equipment class

Gas/Vapor or dust classification on site	Allowable equipment class
IIA	II, IIA, IIB, and IIC
IIB	II, IIB, and IIC
I2C	II and I2C
IIIA	IIIA, IIIB, and IIIC
IIIB	IIIB and IIIC
IIIC	IIIC

Table 1–4 Type of protection selection in dust hazardous areas

Dust classification	Zone 20	Zone 21	Zone 22
Non-conductive dust	tD A20 tD B20 iaD maD	tD A20 and tD A21 tD B20 and tD B21 iaD and ibD maD and mbD pD	tD A20, tD A21, and tD A22 tD B20, tD B21, and tD B22 iaD and ibD maD and mbD pD
Conductive dust	tD A20 tD B20 iaD maD	tD A20 and tD A21 tD B20 and tD B21 iaD and ibD maD and mbD pD	tD A20, tD A21, and tD A22 tD B20, tD B21, and tD B22 iaD and ibD maD and mbD pD
Combustible fibers	tD A20 tD B20 iaD maD	tD A20 and tD A21 tD B20 and tD B21 iaD and ibD maD and mbD pD	tD A20, tD A21, and tD A22 tD B20, tD B21, and tD B22 iaD and ibD maD and mbD pD

Table 1–5 Relationship between EPL and the type of protection

EPL	Type of protection	Mark
Ga	Intrinsically safe	"Ia"
	Encapsulation	"Ma"
	Two independent types of protection that compliant with EPL "Gb"	
	Protection of optical radiation equipment and transmission system	
Gb	Flameproof enclosure	"d"
	Increased safety	"e"[a]
	Intrinsically safe	"B"
	Encapsulation	"Mb"
	Oil-immersion	"o"
	Pressurized enclosure	"p", "px", and "py"
	Powder filling	"q"
	Fieldbus intrinsically safe concept (FISCO)	
	Protection of optical radiation equipment and transmission system	
Gc	Intrinsically safe	"ic"
	Increased safety	"e"
	Encapsulation	"mc"
	Non-sparking	"n" or "A"
	Restricted breathing	"Rn"
	Energy-limited	"L"
	Non-incendive	"nC"
	Pressurized enclosure	"pz"
	Fieldbus non-incendive concept (FNICO)	
	Protection of optical radiation equipment and transmission system	
Da	Intrinsically safe	"iD"
	Encapsulation	"mD"
	Enclosure protection	"tD"
Db	Intrinsically safe	"iD"
	Encapsulation	"mD"
	Enclosure protection	"tD"
	Pressurized enclosure	"pD"
Dc	Intrinsically safe	"iD"
	Encapsulation	"mD"
	Enclosure protection	"tD"
	Pressurized enclosure	"pD"

[A] In China, the type "e" devices that comply with EPL Gb class are limited to:

- Electrical products with terminal boxes that do not generate sparks, arcing, or hazardous temperatures during operation, with the wiring part compliant with type "e" and other part compliant with type "d" or "mb".
- Type "e" low-voltage asynchronous motors that configured with proper thermal protection device (see GB/T 3836.3-2021), but motors being started frequently or operating in harsh environments excluded
- Type "e" fluorescent lamp

2 List of Model Selection

Drives that applicable to motors with 23-bit encoder (SV670N-PTC)

Servo motor				Servo drive SV670N*****-PTC			
Model of the motor without brake	Model of the motor with brake	Frame size (mm)	Capacity (kW)	Voltage class	Size	Recommended drive model	No.
Explosion protection level: Ex db IIC T5 Gb/Ex tb IIIC T100℃ Db IP67							
Ratings of MS1H4 series motors (n_N = 3000 rpm, n_{max} = 7000 rpm)							
MS1H4-20B30CB-A331R-EX d T5	MS1H4-20B30CB-A334R-EX d T5	60	0.2	Single-phase 220 V	A	S1R6I	2
MS1H4-40B30CB-A331R-EX d T5	MS1H4-40B30CB-A334R-EX d T5		0.4	Single-phase 220 V		S2R8I	3
MS1H4-55B30CB-A331R-EX d T5	-	80	0.55	Single-phase 220 V	C	S5R5I	5
MS1H4-75B30CB-A331R-EX d T5	MS1H4-75B30CB-A334R-EX d T5		0.75	Single-phase 220 V		S5R5I	5
MS1H4-90B30CB-A331R-EX d T5	MS1H4-90B30CB-A334R-EX d T5		0.9	Single-phase/Three-phase 220 V		S7R6I	6
Ratings of MS1H3 series motors (n_N = 1500 rpm, n_{max} = 4500 rpm)							
MS1H3-85B15CD-A331R-EX d T5	MS1H3-85B15CD-A334R-EX d T5	130	0.85	Three-phase 380 V	C	T3R5I	10001
MS1H3-13C15CD-A331R-EX d T5	MS1H3-13C15CD-A334R-EX d T5		1.3	Three-phase 380 V		T5R4I	10002
MS1H3-16C15CD-A331R-EX d T5	MS1H3-16C15CD-A334R-EX d T5		1.6	Three-phase 380 V	D	T8R4I	10003
MS1H3-29C15CD-A331R-EX d T5	MS1H3-29C15CD-A334R-EX d T5	180	2.9	Three-phase 380 V		T012I	10004
MS1H3-37C15CD-A331R-EX d T5	MS1H3-37C15CD-A334R-EX d T5		3.7	Three-phase 380 V	E	T017I	10005
MS1H3-45C15CD-A331R-EX d T5	MS1H3-45C15CD-A334R-EX d T5		4.5	Three-phase 380 V		T026I	10007
Explosion protection level: Ex db IIC T4 Gb/Ex tb IIIC T135℃ Db IP67							
Ratings of MS1H4 series motors (n_N = 3000 rpm, n_{max} = 7000 rpm)							
MS1H4-10C30CB-A331R-EX d T4	MS1H4-10C30CB-A334R-EX d T4	80	1.0	Single-phase/Three-phase 220 V	C	S7R6I	6
Ratings of MS1H3 series motors (n_N = 1500 rpm, n_{max} = 4500 rpm)							
MS1H3-18C15CD-A331R-EX d T4	MS1H3-18C15CD-A334R-EX d T4	130	1.8	Three-phase 380 V	D	T8R4I	10003
MS1H3-29C15CD-A331R-EX d T4	MS1H3-29C15CD-A334R-EX d T4	180	2.9	Three-phase 380 V		T012I	10004
MS1H3-44C15CD-A331R-EX d T4	MS1H3-44C15CD-A334R-EX d T4		4.4	Three-phase 380 V	E	T017I	10005
MS1H3-55C15CD-A331R-EX d T4	MS1H3-55C15CD-A334R-EX d T4		5.5	Three-phase 380 V		T021I	10006
MS1H3-75C15CD-A331R-EX d T4	MS1H3-75C15CD-A334R-EX d T4		7.5	Three-phase 380 V		T026I	10007

Drives applicable to motors with 23-bit encoder (SV660)

Motor				Servo drive SV660******			
Model of the motor without brake	Model of the motor with brake	Frame size (mm)	Capacity (kW)	Voltage class	Size	Recommended drive model	No.
Explosion protection level: Ex db IIC T5 Gb/Ex tb IIIC T100℃ Db IP67							
Ratings of MS1H4 series motors (n_N = 3000 rpm, n_{max} = 7000 rpm)							

Motor				Servo drive SV660******			
Model of the motor without brake	Model of the motor with brake	Frame size (mm)	Capacity (kW)	Voltage class	Size	Recommended drive model	No.
MS1H4-20B30CB-A331R-EX d T5	MS1H4-20B30CB-A334R-EX d T5	60	0.2	Single-phase 220 V	A	S1R6I	2
MS1H4-40B30CB-A331R-EX d T5	MS1H4-40B30CB-A334R-EX d T5		0.4	Single-phase 220 V		S2R8I	3
MS1H4-55B30CB-A331R-EX d T5	-	80	0.55	Single-phase 220 V	C	S5R5I	5
MS1H4-75B30CB-A331R-EX d T5	MS1H4-75B30CB-A334R-EX d T5		0.75	Single-phase 220 V		S5R5I	5
MS1H4-90B30CB-A331R-EX d T5	MS1H4-90B30CB-A334R-EX d T5		0.9	Single-phase/Three-phase 220 V		S7R6I	6
Ratings of MS1H3 series motors (n_N = 1500 rpm, n_{max} = 4500 rpm)							
MS1H3-85B15CD-A331R-EX d T5	MS1H3-85B15CD-A334R-EX d T5	130	0.85	Three-phase 380 V	C	T3R5I	10001
MS1H3-13C15CD-A331R-EX d T5	MS1H3-13C15CD-A334R-EX d T5		1.3	Three-phase 380 V		T5R4I	10002
MS1H3-16C15CD-A331R-EX d T5	MS1H3-16C15CD-A334R-EX d T5		1.6	Three-phase 380 V	D	T8R4I	10003
MS1H3-29C15CD-A331R-EX d T5	MS1H3-29C15CD-A334R-EX d T5	180	2.9	Three-phase 380 V		T012I	10004
MS1H3-37C15CD-A331R-EX d T5	MS1H3-37C15CD-A334R-EX d T5		3.7	Three-phase 380 V	E	T017I	10005
MS1H3-45C15CD-A331R-EX d T5	MS1H3-45C15CD-A334R-EX d T5		4.5	Three-phase 380 V		T026I	10007
Explosion protection level: Ex db IIC T4 Gb/Ex tb IIIC T135℃ Db IP67							
Ratings of MS1H4 series motors (n_N = 3000 rpm, n_{max} = 7000 rpm)							
MS1H4-10C30CB-A331R-EX d T4	MS1H4-10C30CB-A334R-EX d T4	80	1.0	Single-phase/Three-phase 220 V	C	S7R6I	6
Ratings of MS1H3 series motors (n_N = 1500 rpm, n_{max} = 4500 rpm)							
MS1H3-18C15CD-A331R-EX d T4	MS1H3-18C15CD-A334R-EX d T4	130	1.8	Three-phase 380 V	D	T8R4I	10003
MS1H3-29C15CD-A331R-EX d T4	MS1H3-29C15CD-A334R-EX d T4	180	2.9	Three-phase 380 V		T012I	10004
MS1H3-44C15CD-A331R-EX d T4	MS1H3-44C15CD-A334R-EX d T4		4.4	Three-phase 380 V	E	T017I	10005
MS1H3-55C15CD-A331R-EX d T4	MS1H3-55C15CD-A334R-EX d T4		5.5	Three-phase 380 V		T021I	10006
MS1H3-75C15CD-A331R-EX d T4	MS1H3-75C15CD-A334R-EX d T4		7.5	Three-phase 380 V		T026I	10007

Drives applicable to motors with 23-bit encoder (IS810-INT)

Motor				Servo drive IS810N50M4T****INT			
Model of the motor without brake	Model of the motor with brake	Frame size (mm)	Capacity (kW)	Voltage class	Size	Recommended drive model	No.
Explosion protection level: Ex db IIC T5 Gb/Ex tb IIIC T100℃ Db IP67							
Ratings of MS1H4 series motors (n_N = 3000 rpm, n_{max} = 7000 rpm)							
MS1H4-20B30CB-A331R-EX d T5	MS1H4-20B30CB-A334R-EX d T5	60	0.2	Three-phase 380 V/ 480 V	A	S(D)3R5	10001
MS1H4-40B30CB-A331R-EX d T5	MS1H4-40B30CB-A334R-EX d T5		0.4	Three-phase 380 V/ 480 V		S(D)3R5	10001

Motor				Servo drive IS810N50M4T****INT			
Model of the motor without brake	Model of the motor with brake	Frame size (mm)	Capacity (kW)	Voltage class	Size	Recommended drive model	No.
MS1H4-55B30CB-A331R-EX d T5	-	80	0.55	Three-phase 380 V/ 480 V	C	S(D)5R4	10002
MS1H4-75B30CB-A331R-EX d T5	MS1H4-75B30CB-A334R-EX d T5		0.75	Three-phase 380 V/ 480 V		S(D)5R4	10002
MS1H4-90B30CB-A331R-EX d T5	MS1H4-90B30CB-A334R-EX d T5		0.9	Three-phase 380 V/ 480 V		S(D)8R4	10003
Ratings of MS1H3 series motors (n_N = 1500 rpm, n_{max} = 4500 rpm)							
MS1H3-85B15CD-A331R-EX d T5	MS1H3-85B15CD-A334R-EX d T5	130	0.85	Three-phase 380 V/ 480 V	C	S(D)3R5	10001
MS1H3-13C15CD-A331R-EX d T5	MS1H3-13C15CD-A334R-EX d T5		1.3	Three-phase 380 V/ 480 V		S(D)5R4	10002
MS1H3-16C15CD-A331R-EX d T5	MS1H3-16C15CD-A334R-EX d T5		1.6	Three-phase 380 V/ 480 V	D	S(D)8R4	10003
MS1H3-29C15CD-A331R-EX d T5	MS1H3-29C15CD-A334R-EX d T5	180	2.9	Three-phase 380 V/ 480 V		S(D)012	10004
MS1H3-37C15CD-A331R-EX d T5	MS1H3-37C15CD-A334R-EX d T5		3.7	Three-phase 380 V/ 480 V	E	S(D)017	10005
MS1H3-45C15CD-A331R-EX d T5	MS1H3-45C15CD-A334R-EX d T5		4.5	Three-phase 380 V/ 480 V		S(D)026	10007
Explosion protection level: Ex db IIC T4 Gb/Ex tb IIIC T135℃ Db IP67							
Ratings of MS1H4 series motors (n_N = 3000 rpm, n_{max} = 7000 rpm)							
MS1H4-10C30CB-A331R-EX d T4	MS1H4-10C30CB-A334R-EX d T4	80	1.0	Three-phase 380 V/ 480 V	C	S(D)8R4	10003
Ratings of MS1H3 series motors (n_N = 1500 rpm, n_{max} = 4500 rpm)							
MS1H3-18C15CD-A331R-EX d T4	MS1H3-18C15CD-A334R-EX d T4	130	1.8	Three-phase 380 V/ 480 V	D	S(D)8R4	10003
MS1H3-29C15CD-A331R-EX d T4	MS1H3-29C15CD-A334R-EX d T4	180	2.9	Three-phase 380 V/ 480 V		S(D)012	10004
MS1H3-44C15CD-A331R-EX d T4	MS1H3-44C15CD-A334R-EX d T4		4.4	Three-phase 380 V/ 480 V	E	S(D)017	10005
MS1H3-55C15CD-A331R-EX d T4	MS1H3-55C15CD-A334R-EX d T4		5.5	Three-phase 380 V/ 480 V		S(D)021	10006
MS1H3-75C15CD-A331R-EX d T4	MS1H3-75C15CD-A334R-EX d T4		7.5	Three-phase 380 V/ 480 V		S(D)026	10007

Drives applicable to motors with 18-bit encoder (SV630)

Motor				Servo drive SV630******			
Model of the motor without brake	Model of the motor with brake	Frame size (mm)	Capacity (kW)	Voltage class	Size	Recommended drive model	No.
Explosion protection level: Ex d IIC T4 Gb and Ex tb IIIC T135℃ Db IP67							
Ratings of MS1H4 series motors (n_N = 3000 rpm, n_{max} = 7000 rpm)							
MS1H4-20B30CB-T331R-EX d T4	MS1H4-20B30CB-T334R-EX d T4	60	0.2	Single-phase 220 V	A	S1R6I	2
MS1H4-40B30CB-T331R-EX d T4	MS1H4-40B30CB-T334R-EX d T4		0.4	Single-phase 220 V		S2R8I	3
MS1H4-55B30CB-T331R-EX d T4	-	80	0.55	Single-phase 220 V	C	S5R5I	5
MS1H4-75B30CB-T331R-EX d T4	MS1H4-75B30CB-T334R-EX d T4		0.75	Single-phase 220 V		S5R5I	5
MS1H4-10C30CB-T331R-EX d T4	MS1H4-10C30CB-T334R-EX d T4		1.0	Single-phase/Three-phase 220 V		S7R6I	6
Ratings of MS1H3 series motors (n_N = 1500 rpm, n_{max} = 4500 rpm)							
MS1H3-85B15CD-T331R-EX d T4	MS1H3-85B15CD-T334R-EX d T4	130	0.85	Three-phase 380 V	C	T3R5I	10001
MS1H3-13C15CD-T331R-EX d T4	MS1H3-13C15CD-T334R-EX d T4		1.3	Three-phase 380 V		T5R4I	10002
MS1H3-18C15CD-T331R-EX d T4	MS1H3-18C15CD-T334R-EX d T4		1.8	Three-phase 380 V	D	T8R4I	10003
MS1H3-29C15CD-T331R-EX d T4	MS1H3-29C15CD-T334R-EX d T4	180	2.9	Three-phase 380 V		T012I	10004
MS1H3-44C15CD-T331R-EX d T4	MS1H3-44C15CD-T334R-EX d T4		4.4	Three-phase 380 V	E	T017I	10005
MS1H3-55C15CD-T331R-EX d T4	MS1H3-55C15CD-T334R-EX d T4		5.5	Three-phase 380 V		T021I	10006
MS1H3-75C15CD-T331R-EX d T4	MS1H3-75C15CD-T334R-EX d T4		7.5	Three-phase 380 V		T026I	10007

Select an application servo drive for MS1-R series high-performance explosion-protected servo motor. Improper servo drives can affect the performance output and explosion-protection performance of the motor. The following shows the mapping relationship between the motor and drive.

Table 2–1 Relationship between servo drive and motor encoder

Drive model	Encoder type	Reference
SV630*****	T3: 18-bit multi-turn absolute encoder	SV630P Series Servo Drive Selection Guide SV630N Series Servo Drive Selection Guide
SV660*****	A3: 23-bit multi-turn absolute encoder	SV660P Series Servo Drive Selection Guide SV660N Series Servo Drive Selection Guide SV660F Series Servo Drive Selection Guide
SV670N*****-PTC	A3: 23-bit multi-turn absolute encoder	-
IS810**********INT	A3: 23-bit multi-turn absolute encoder	IS810-INT Series Standard Servo Drive (Multi-drive System) User Guide

Note

Models of drives:

- S - 220 V voltage class
- T - 380 V voltage class
- 1R6 - Rated output current = 1.6 A
  2R8 - Rated output current = 2.8 A
  …
  026 - Rated output current = 26 A
  027 - Rated output current = 27 A
- Drive models S018, S022, and S027 are only available for SV670 series servo drives.

Drives that applicable to motors equipped with A3 encoder must be used together with a PTC temperature control module (except SV670N-PTC series drives). Otherwise, exceptions cannot be monitored, incurring the risk of explosion.

3 Product Information

3.1 Product Characteristics

CCC explosion protection certification

- Ex db IIC T5 Gb, Ex tb IIIC T100℃ Db IP67
- Ex db IIC T4 Gb, Ex tb IIIC T135℃ Db IP67

Cable outcoming type

- Wiring can be performed easily through the terminal blocks of the junction box.
- You can select the general explosion-protected stuffing gland or threaded explosion-protected stuffing gland.
- The cable outcoming directions of the junction box can be in the front/rear/left/right.
- The cable outcoming length is available in 3 m, 5 m, and 10 m, or other customized length.

Complete product series

- The motor ranges from 0.2 kW to 7.5 kW, with rated torque covering 0.64 N·m to 48 N·m and maximum torque reaching 119 N·m. Frame sizes 60 to 180 are available.
- The encoder can be 18-bit or 23-bit multi-turn absolute encoder to fit different point-to-point control requirements.

Energy Efficiency Class 1

The MS1-R series explosion-protected motors of 0.55 kW to 7.5 kW comply with Energy Efficiency Class 1 in standard GB 30253-2013. Motors of MS1H3-45C15CD-A33*R-EX d T5 comply with Energy Efficiency Class 2.

3.2 Model and Nameplate

Model description

MS1 H4 - 75B 30C B - A3 3 4 R - EX d T5
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

① **MS1 series servo motor**	④ **Rated speed (rpm)** One letter and two digits B: x 10 C: x 100 Example: 30C: 3000 rpm	⑦ **Shaft connection mode** 1: Plain shaft 2: Hollow taper shaft 3: Solid shaft, with key and threaded hole 5: Solid with threaded holes
② **Inertia and capacity** H3: Medium inertia and medium capacity H4: Medium inertia and small capacity		⑧ **Brake, reducer and oil seal** 0: None 1: With oil seal but no brake 2: With brake 4: With brake and oil seal
③ **Rated power (W)** One letter and two digits B: x 10 C: x 100 Example: 20B: 200 W	⑤ **Voltage class (V)** B: 220 D: 380	⑨ **Motor series** R: R version
	⑥ **Encoder type** One letter and one digit A3: 23-bit multi-turn absolute optical encoder T3: 18-bit multi-turn absolute magnetic encoder	⑩ **Explosion protection level** EX d T5: Ex db IIC T5 Gb/Ex tb IIIC T100℃ Db IP67 EX d T4: Ex db IIC T4 Gb/Ex tb IIIC T130℃ Db IP67

Gas certification

Ex db IIC T5 Gb
① ② ③ ④ ⑤

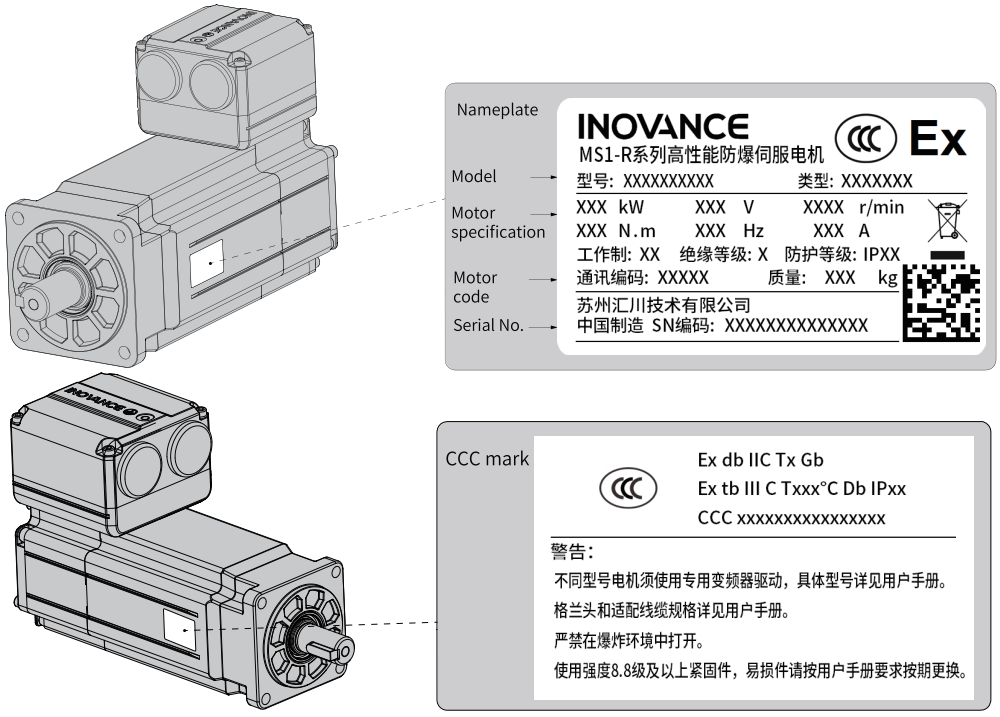
① **Mark** Ex: Explosion protection mark	③ **Electrical equipment category** IIC: Gas category (hydrogen and acetylene supported) Note: It applies to both IIA and IIB.	⑤ **Equipment protection level** Gb: The gas explosion protection level is Zone 1. Note: It also applies to Gc Zone 2.
② **Electrical equipment explosion protection level** db: Explosion-protected	④ **Enclosure temperature (the lower, the safer)** T5: Maximum motor enclosure temperature: 100℃ T4: Maximum motor enclosure temperature: 135℃	

Dust certification

Ex ① tb ② IIIC ③ T100°C ④ Db ⑤ IP67 ⑥

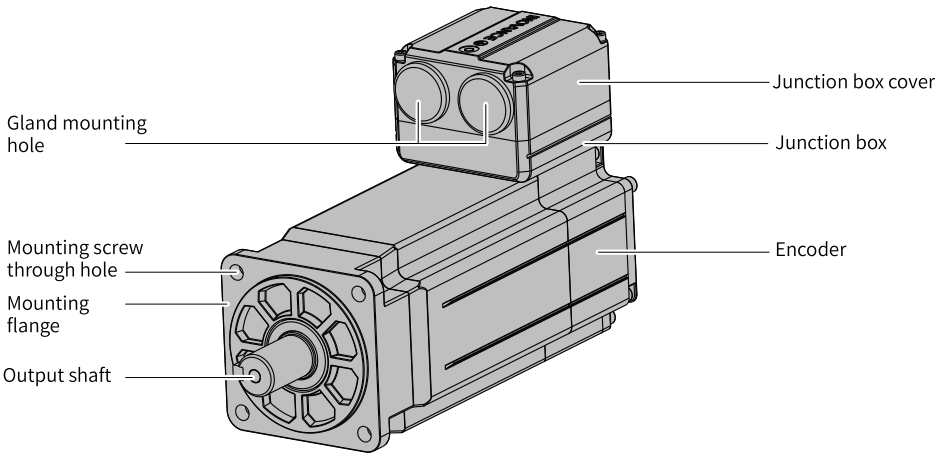
① **Mark** Ex: Explosion protection mark	③ **Electrical equipment category** IIIC: Allowable dust category (conductive dust supported) Note: It applies to both IIIA and IIIB.	⑤ **Equipment protection level** Gb: The gas explosion protection level is Zone 1. Note: It also applies to Gc Zone 2.
② **Electrical equipment explosion protection level** tb: Explosion-protected enclosure	④ **Enclosure temperature (the lower, the safer)** T100: Maximum motor enclosure temperature: 100℃ T135: Maximum motor enclosure temperature: 135℃	⑥ **Degree of protection** IP67: Dust and water protection rated to IP67

Nameplate description

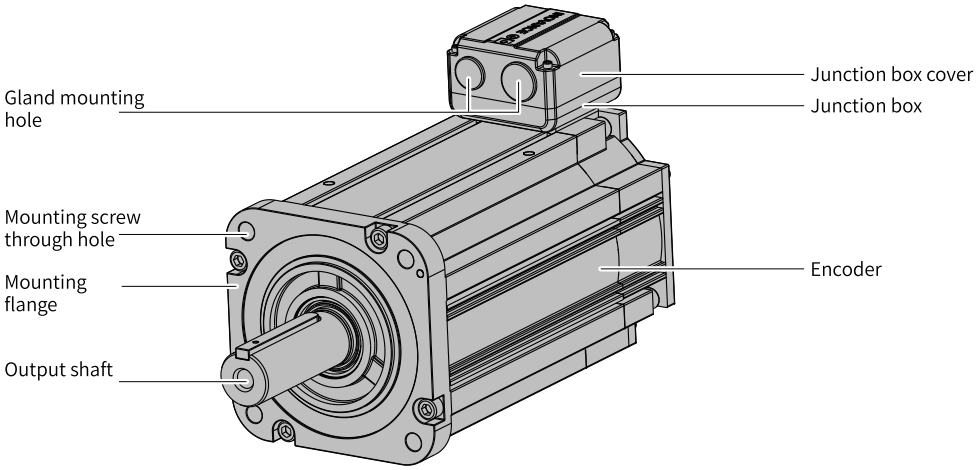


3.3 Motor Components

Motor (frame sizes 60/80)



Motor (frame sizes 130/180)



3.4 Junction Box

Components

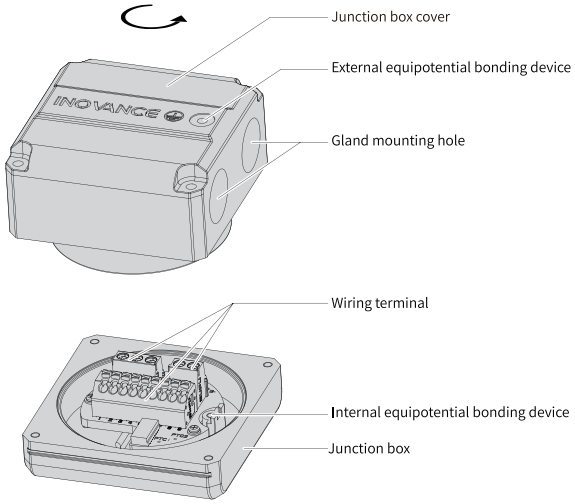


Figure 3-1 Components of the junction box for motors in frame sizes 60/80

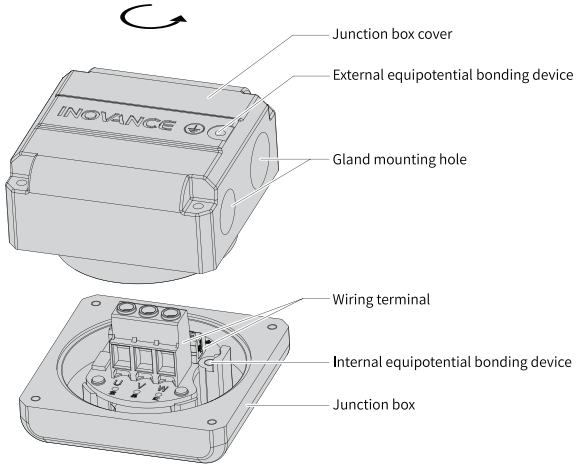


Figure 3-2 Components of the junction box for motors in frame sizes 130/180

Technical data of the junction box

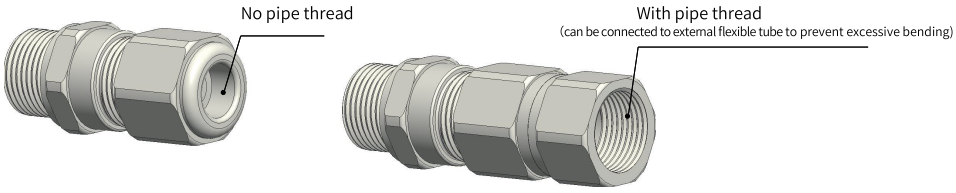
The junction box cover locates on the top of the motor. It can be rotated 4 x 90 degrees during installation, allowing the cable to enter from all directions. The junction box of Inovance MS1-R series high-performance explosion-protected servo motor is equipped with a power cable incoming hole and encoder cable incoming hole. Motors in frame sizes 60/80 must be equipped with two M20x1.5 explosion-protected glands with stuffing box. Motors in frame sizes 130/180 must be equipped with one M20x1.5 and one M25x1.5 explosion-protected glands with stuffing box. Proper stuffing is needed during use.

Gland selection

Regular glands or threaded glands can be used as needed. The gland needed varies with the specification of the wire harness. (The gland purchased by the user must carry the stuffing box and features an explosion protection class equal to or higher than that of the motor. Proper stuffing is required during use. Improper stuffing can result in failure of the explosion protection function.)

$$\underset{①}{\text{Exd}} - \underset{②}{\text{SSF}} - \underset{③}{\text{M20}} - \underset{④}{\text{08}}$$

① **Explosion protection mark**	③ **Thread specification**	④ **Max. outer diameter of the applicable cable**
② **Type** SSF: Regular explosion-proof gland with stuffing box SSFT: Threaded explosion-proof gland with stuffing box	M20: M20 x 1.5 M25: M25 x 1.5	08: ≤ 8 mm (M20 only) 12: ≤ 12 mm (M20 only) 15: ≤ 15 mm (M25 only)



Regular explosion-protected gland with stuffing box

Threaded explosion-protected gland with stuffing box

Model	Thread specification	Type	Applicable cable diameter range (mm)	Thread specification	Minimum stuffing magnitude (ml)	Recommended gland brand
Exd-SSF-M20-08	M20x1.5	Regular	3 to 8	-	5	BEISIT
Exd-SSF-M20-12	M20x1.5		7.5 to 12	-	5	
Exd-SSF-M25-15	M25x1.5		9 to 15	-	10	
Exd-SSFT-M20-08	M20x1.5	Threaded	3 to 8	M20 x 1.5	5	
Exd-SSFT-M20-12	M20x1.5		7.5 to 12	M20 x 1.5	5	
Exd-SSFT-M25-15	M25x1.5		9 to 15	M25 x 1.5	10	

Caution

When selecting the flameproof flexible conduit or explosion-protected gland, the maximum outer diameter cannot exceed 32 mm for M20x1.5 or 42 mm for M25x1.5. Failure to comply can result in interference.

Stuffing selection

Model	Specification	Condition for initial curing	Condition for complete curing	Manufacturer
Exd-AB	50 ml	23℃@30 min	23℃@24 h	BEISIT AB glue/TAISHENG TS830

Note

One tube of AB glue can be applied to eight M20 or four M25 glands.

Tightening torque of the junction box and gland

Item	Required torque (N·m)
Screws for fixing the junction box	M3 specification for frame sizes 60/80: 1.5±0.1 M4 specification for frame sizes 130/180: 2.5±0.1
Main body of the gland	M20: 15±0.5 M25: 35±1
Lock nut of the gland	M20: 10±0.5 M25: 30±1

Warning

Apply the recommended tightening torque. Failure to comply can result in failure of the explosion protection function or component damage.

Equipotential bonding

As shown in the following figure, the product is equipped with internal and external equipotential bonding devices to ensure motor stability and safe operation. For motors applied in explosive atmospheres, both the internal and external equipotential conductors must be connected. The internal and external grounding specifications are shown in *"Table 3-1" on page 20*.

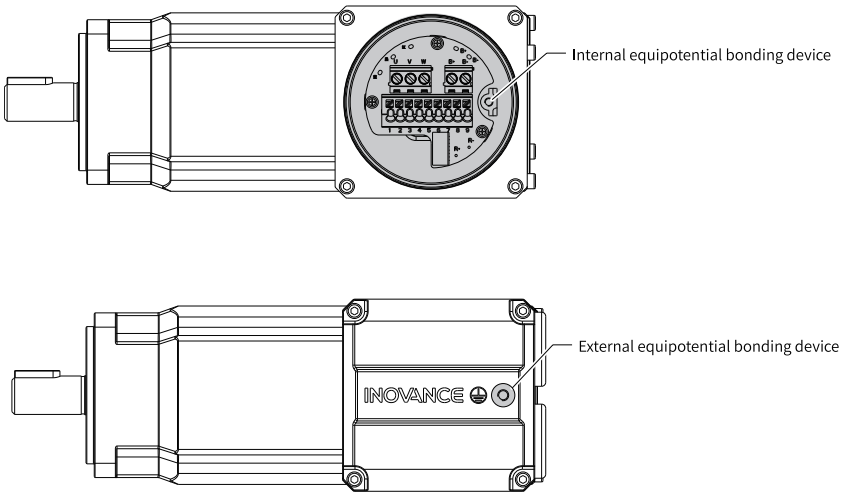


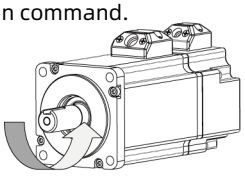
Figure 3-3 Equipotential bonding device

Table 3–1 Equipotential bonding device

Frame size	Internal			Surface cleanness		
	Insulation terminal	Cable	Screw hole	Insulation terminal	Cable	Screw hole
60	≥ 16AWG	≥ 16AWG	M3 hole depth 6	≥ 16AWG	≥ 16AWG	M4 hole depth 10
80	≥ 16AWG	≥ 16AWG	M3 hole depth 6	≥ 16AWG	≥ 16AWG	M4 hole depth 10
130	≥ 16AWG	≥ 16AWG	M5 hole depth 13.5	≥ 16AWG	≥ 16AWG	M5 hole depth 8
180	≥ 12AWG	≥ 12AWG	M5 hole depth 13.5	≥ 12AWG	≥ 12AWG	M5 hole depth 8

4 Product Specifications

4.1 Mechanical Specifications

Item	Description
Explosion-protection mark (CCC certification system)	Gas: Ex db IIC T5/T4 Gb Dust: Ex tb IIIC T100℃/T135℃ Db IP67
Duty cycle	S1 (Continuous duty)
Vibration level [1]	V15
Insulation resistance	500 VDC, above 50 MΩ
Excitation mode	Permanent magnetic
Type of construction	Flange
Thermal class	F (155℃)
Insulation voltage	1500 VAC for 1 min (220 V class) 1800 VAC for 1 min (380 V class)
Degree of protection	IP67 (IP67-compliant within 500 h at shaft extension, IP65-compliant after 500 h)
Direction of rotation	Rotates counterclockwise (CCW) when viewed from the shaft extension side with the forward run command.  CCW

Item		Description
Ambient condition	Ambient temperature	0℃ to 40℃ (non-frozen) (Derate based on the derating curve for temperatures above 40℃.)
	Ambient humidity	20% to 80% (without condensation)
	Explosive atmospheres supported	Gas: Zone 1 explosive gas atmosphere with IIC gas category, with ambient temperature of explosive gas atmosphere higher than 100℃ (T5)/135℃ (T4); (Gas category complies with GB/T 3836.11.) Dust: Zone 21 explosive dust atmosphere with IIIC dust category, with the minimum ignition temperature of the explosive dust atmosphere higher than 100℃ (T100℃)/135℃ (T135℃)
	Installation location	• Indoors without corrosives • Well ventilated with minimum amount of dust, waste and moisture • Convenient for inspection and cleanup • Derating is required only for installation altitudes higher than 1000 m. See details in *"4.3 Derating Characteristics" on page 26* • Away from sources that may generate strong magnetic field • Away from heating sources such as a heating stove • The oil seal is only dust-proof and water-proof. It cannot withstand the intrusion of oil for a long term. • Not applicable to vacuum environment • Not applicable to inching (not full-turn) [2] and may be stuck • The motor with brake may generate a pattering sound, which is normal. • In upstream applications of the motor, ensure the force applied on the shaft end is lower than the allowable axial force and radial force of the motor. • Do not keep the system operating continuously at natural frequency. Exceeding the allowable vibration value may damage the system.
	Storage environment	Observe the following requirements for storing a de-energized motor. • Storage temperature: -20℃ to +60℃ (non-frozen) • Storage humidity: 20% to 80% RH (without condensation)
Shock resistance [3] [5]	Shock acceleration (flange face as standard)	490 m/s^2
	Number of shocks	2
Vibration resistance [4][5]	Vibration acceleration (flange face as standard)	Radial 49 m/s^2 Axial 24.5 m/s^2

Note

- [1] Vibration class V15 indicates that the amplitude of vibration is less than 15 μm when a motor rotates at its rated value.
- [2] For applications that require the motor shaft to swing back and forth at a certain angle, contact Inovance.
- [3] The resistance for shock in the vertical direction when the servo motor is mounted with the shaft in a horizontal position is shown in the preceding table.
- [4] The vertical, side-to-side, and front-to-back resistance for vibration in three directions when the servo motor is mounted with the shaft in a horizontal position is shown in the preceding table.
- [5] The vibration intensity applied on the motor is affected by the transmission structure, alignment accuracy, mounting conditions, and external vibration. These factors may enhance the vibration applied on the motor. When the maximum allowable vibration limit is exceeded, the motor may fail. Therefore, take necessary measures to limit resonance.
- The vibration intensity applied on the motor varies with applications.

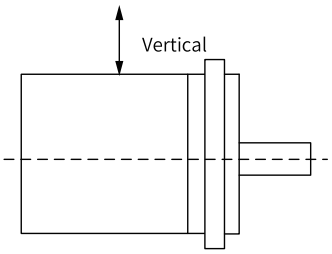


Figure 4-1 Shock applied on the motor

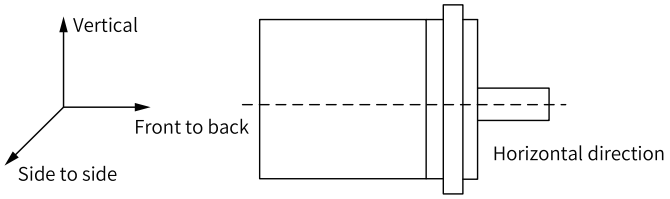


Figure 4-2 Vibration applied on the motor

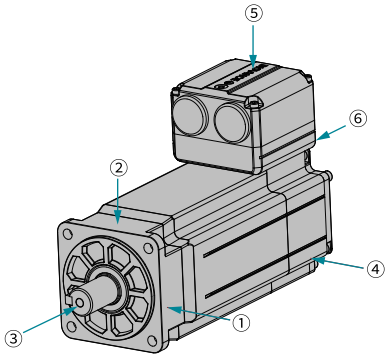


Figure 4-3 Max. allowable vibration limit of the motor

Direction	Measuring point	Limit value (10 Hz to 200 Hz)
Radial	①②	49 m/s^2
	④⑤	49 m/s^2
Axial	③	24.5 m/s^2
	⑥	24.5 m/s^2

Note

The preceding vibration/shock standards cannot be applied for a long term. For long-term application, contact Inovance.

4.2 Overload Characteristics

This product is compliant with NEC and CEC requirements and equipped with protective functions against motor overload and overtemperature.

The following overload protection curve applies to hot start at an ambient temperature of 40℃, which cannot guarantee continuous use under 100%+ output. During use, keep the effective torque of the load within the continuous duty zone.

To protect different load motors, set the motor overload protection gain based on the overload capacity of the motor. Use the default gains in general conditions, however, when one of the following condition occurs, change the gains based on the temperature rise condition of the motor:

- The motor works in environments with high ambient temperature.
- The motor is in cyclic motion featuring a short motion cycle and frequent acceleration/ deceleration.
- Overload thermal protection only occurs during continuous energized operation. You need to check the motor temperature when the drive is powered off.

Motor overload protection curve is as follows:

- **MS1H4 (frame sizes 60/80)**

Load ratio (%)	Operating time (s)
120	230
130	80
140	40
150	30
160	20
170	17
180	15
190	12
200	10
210	8.5
220	7
230	6
240	5.5
250	5
300	3
350	2

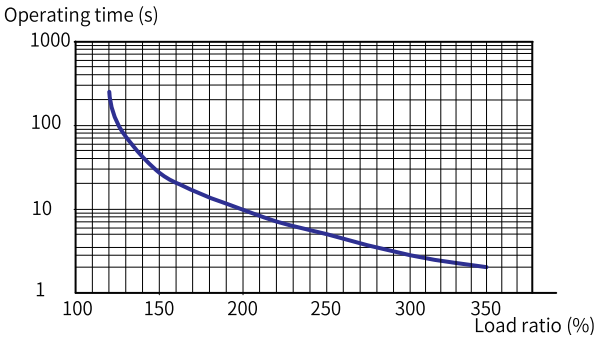


Figure 4-4 MS1H4 (frame sizes 60/80) series motor overload curves

Note

The maximum torque of H4 models is the rated torque x 3.5.

- **MS1H3 (frame sizes 130/180)**

Load ratio (%)	Operating time (s)
115	6000
120	2533
125	1226

Load ratio (%)	Operating time (s)
130	915
135	769
140	527
145	352
150	221
155	128
160	99
165	83
170	67
175	55
180	49
185	45
190	41
195	38
200	34
205	31
210	28
215	24
220	22
225	21
230	19
235	18
240	16
245	14
250	13
255	12
260	11
265	10
270	9
275	9
280	8
285	7
290	6
295	5
300	5
350	3
400	1

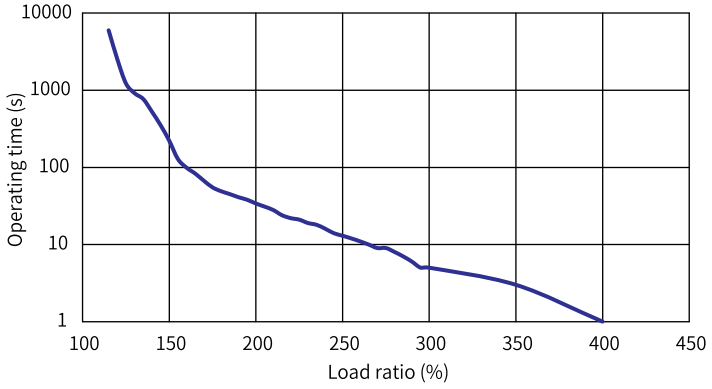


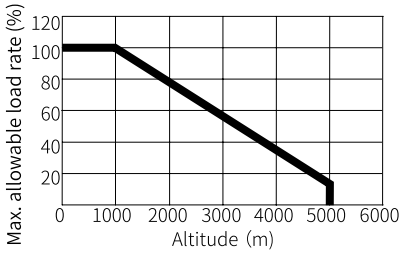
Figure 4-5 MS1H3 (frame sizes 130/180) series motor overload curves

Note

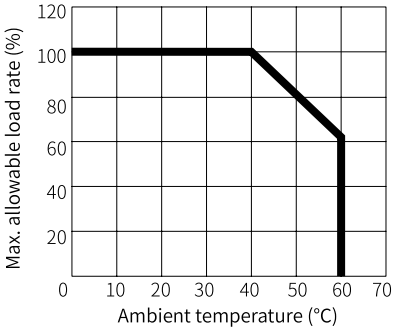
The maximum torque of H3 models is the rated torque x 2.5.

4.3 Derating Characteristics

- **Altitude-based derating curve**



- **Temperature-based derating curve**



4.4 Operating Frequency

Table 4–1 Motor operating frequency

Frame size (mm)	Motor model	Constant torque frequency (Hz)	Constant power frequency (Hz)	Protection level
60	MS1H4-20B30CB-A331R-EX d T5	0 to 250	250 to 500	Ex db IIC T5 Gb Ex tb IIIC T100℃ Db IP67
	MS1H4-20B30CB-A334R-EX d T5	0 to 250	250 to 500	
	MS1H4-40B30CB-A331R-EX d T5	0 to 250	250 to 500	
	MS1H4-40B30CB-A334R-EX d T5	0 to 250	250 to 500	
80	MS1H4-55B30CB-A331R-EX d T5	0 to 250	250 to 500	
	MS1H4-75B30CB-A331R-EX d T5	0 to 250	250 to 500	
	MS1H4-75B30CB-A334R-EX d T5	0 to 250	250 to 500	
	MS1H4-90B30CB-A331R-EX d T5	0 to 250	250	
	MS1H4-90B30CB-A334R-EX d T5	0 to 250	250	
130	MS1H3-85B15CD-A331R-EX d T5	0 to 125	125 to 375	
	MS1H3-85B15CD-A334R-EX d T5	0 to 125	125 to 375	
	MS1H3-13C15CD-A331R-EX d T5	0 to 125	125 to 375	
	MS1H3-13C15CD-A334R-EX d T5	0 to 125	125 to 375	
	MS1H3-16C15CD-A331R-EX d T5	0 to 125	125	
	MS1H3-16C15CD-A334R-EX d T5	0 to 125	125	
180	MS1H3-29C15CD-A331R-EX d T5	0 to 125	125 to 167	
	MS1H3-29C15CD-A334R-EX d T5	0 to 125	125 to 167	
	MS1H3-37C15CD-A331R-EX d T5	0 to 125	125 to 150	
	MS1H3-37C15CD-A334R-EX d T5	0 to 125	125 to 150	
	MS1H3-44C15CD-A331R-EX d T5	0 to 125	125	
	MS1H3-44C15CD-A334R-EX d T5	0 to 125	125	
	MS1H3-45C15CD-A331R-EX d T5	0 to 125	125	
	MS1H3-45C15CD-A334R-EX d T5	0 to 125	125	
80	MS1H4-10C30CB-A331R-EX d T4	0 to 250	250 to 500	Ex db IIC T4 Gb Ex tb IIIC T135℃ Db IP67
	MS1H4-10C30CB-A334R-EX d T4	0 to 250	250 to 500	
130	MS1H3-18C15CD-A331R-EX d T4	0 to 125	125 to 375	
	MS1H3-18C15CD-A334R-EX d T4	0 to 125	125 to 375	
180	MS1H3-29C15CD-A331R-EX d T4	0 to 125	125 to 375	
	MS1H3-29C15CD-A334R-EX d T4	0 to 125	125 to 375	
	MS1H3-44C15CD-A331R-EX d T4	0 to 125	125 to 375	
	MS1H3-44C15CD-A334R-EX d T4	0 to 125	125 to 375	
	MS1H3-55C15CD-A331R-EX d T4	0 to 125	125 to 250	
	MS1H3-55C15CD-A334R-EX d T4	0 to 125	125 to 250	
	MS1H3-75C15CD-A331R-EX d T4	0 to 125	125 to 250	
	MS1H3-75C15CD-A334R-EX d T4	0 to 125	125 to 250	

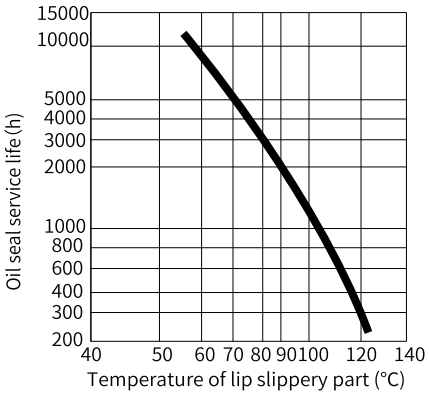
Frame size (mm)	Motor model	Constant torque frequency (Hz)	Constant power frequency (Hz)	Protection level
60	MS1H4-20B30CB-T331R-EX d T4	0 to 250	250 to 500	Ex db IIC T4 Gb Ex tb IIIC T135℃ Db IP67
	MS1H4-20B30CB-T334R-EX d T4	0 to 250	250 to 500	
	MS1H4-40B30CB-T331R-EX d T4	0 to 250	250 to 500	
	MS1H4-40B30CB-T334R-EX d T4	0 to 250	250 to 500	
80	MS1H4-55B30CB-T331R-EX d T4	0 to 250	250 to 500	
	MS1H4-75B30CB-T331R-EX d T4	0 to 250	250 to 500	
	MS1H4-75B30CB-T334R-EX d T4	0 to 250	250 to 500	
	MS1H4-10C30CB-T331R-EX d T4	0 to 250	250 to 500	
	MS1H4-10C30CB-T334R-EX d T4	0 to 250	250 to 500	
130	MS1H3-85B15CD-T331R-EX d T4	0 to 125	125 to 250	
	MS1H3-85B15CD-T334R-EX d T4	0 to 125	125 to 250	
	MS1H3-13C15CD-T331R-EX d T4	0 to 125	125 to 250	
	MS1H3-13C15CD-T334R-EX d T4	0 to 125	125 to 250	
	MS1H3-18C15CD-T331R-EX d T4	0 to 125	125 to 250	
	MS1H3-18C15CD-T334R-EX d T4	0 to 125	125 to 250	
180	MS1H3-29C15CD-T331R-EX d T4	0 to 125	125 to 250	
	MS1H3-29C15CD-T334R-EX d T4	0 to 125	125 to 250	
	MS1H3-44C15CD-T331R-EX d T4	0 to 125	125 to 250	
	MS1H3-44C15CD-T334R-EX d T4	0 to 125	125 to 250	
	MS1H3-55C15CD-T331R-EX d T4	0 to 125	125 to 250	
	MS1H3-55C15CD-T334R-EX d T4	0 to 125	125 to 250	
	MS1H3-75C15CD-T331R-EX d T4	0 to 125	125 to 250	
	MS1H3-75C15CD-T334R-EX d T4	0 to 125	125 to 250	

4.5 Carrier Frequency of the Drive

Table 4–2 Carrier frequency of the drive

Frame size (mm)	Encoder type	Carrier frequency (Hz)
60	23-bit multi-turn absolute encoder	≥ 12 k
	18-bit multi-turn absolute encoder	≥ 12 k
80	23-bit multi-turn absolute encoder	≥ 12 k
	18-bit multi-turn absolute encoder	≥ 12 k
130	23-bit multi-turn absolute encoder	≥ 8 k
	18-bit multi-turn absolute encoder	≥ 7 k
180	23-bit multi-turn absolute encoder	≥ 5 k
	18-bit multi-turn absolute encoder	≥ 5 k

4.6 Temperature curve of the oil seal



4.7 Service Life of the Bearing

The service life of the bearing is 20000 hours under specified installation/operating environment, with special factors that can shorten the service life taken into account, such as the shaft extension being subject to a force that exceeds the permissible load of the motor. If the bearing generates unusual noise or gets stuck, contact Inovance. Do not replace the bearing by yourself.

4.8 Load Moment of Inertia

The load moment of inertia represents the inertia of the load. The larger the load moment of inertia is, the weaker the responsiveness is. An excessively high inertia may result in unstable motion. The permissible load moment of inertia ratio is usually equal to or lower than 25. This value is a general standard and varies according to the driving conditions of the motor.

An overvoltage alarm may occur during deceleration if the load moment of inertia exceeds the allowable value. For servo drives with a built-in braking resistor, an overload alarm my be present. In case of such warnings, take one of the following measures:

- Reduce the torque limit values.
- Reduce the deceleration rate.
- Reduce the maximum speed.
- Install an external braking resistor if the warning cannot be cleared using the above measures.

Caution

- For the built-in braking resistor of the drive, see Components.
- Even you use a built-in resistor, the energy generated in some regenerative conditions may exceed the allowable capacity loss (W) of the resistor. In this case, an external braking resistor is required.

4.9 PTC Temperature Control Module

Drives that applicable to motors equipped with A3 encoder must be used together with a PTC temperature control module (except SV670N-PTC series drives). Otherwise, exceptions cannot be monitored, incurring the risk of explosion.

Technical data

The MS1-R series high-performance explosion-protected servo motor (with 23-bit multi-turn absolute encoder) is set with a PTC (thermistor) to monitor the temperature rise of the motor. The motor must be used together with a PTC temperature control module. You can use a drive with a built-in PTC temperature control module, such as SV670N-PTC series drives, or you can use other drives together with a PTC temperature control module. The PTC temperature module selected must comply with the characteristics listed in the following table.

PTC	Characteristics
Maximum withstand voltage	30 V
Rated voltage/current	≤ 2.5 V/ < 2 mA
TK℃ resistance	≤ 300 Ω
TK-5℃	≤ 1650 Ω
TK+5℃	≥ 3990 Ω
TK+15℃	≥ 12 kΩ

Table 4–3 Requirements on PTC temperature control module

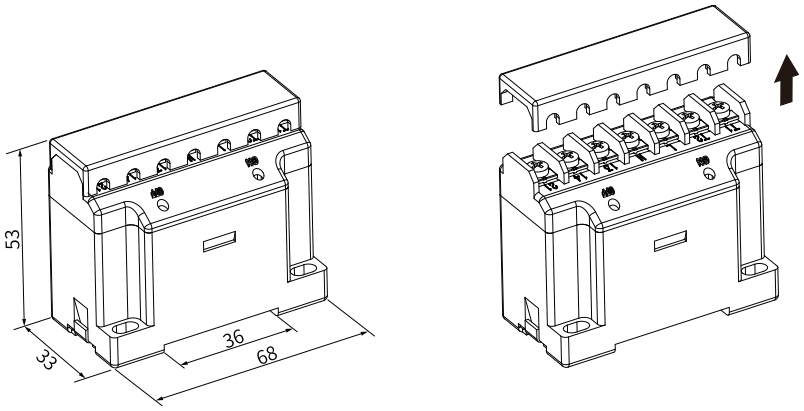
Item	Specification
Operating voltage	24 V (AC)
Frequency of the power supply	47 Hz to 63 Hz
Protective resistor	2.7 kΩ to 3.3 kΩ
Recovery resistor	1.5 kΩ to 1.8 kΩ
Power dissipation	0.8 W
Power consumption	≤ 15%
Contact current	7 A/250 VAC (resistive)
Mounting method	Guide rail, fixing hole
Ambient humidity	5% to 95% RH
Ambient temperature	-20℃ to +65℃
Storage humidity	-25℃ to +70℃
Transportation temperature	-25℃ to +70℃

Note

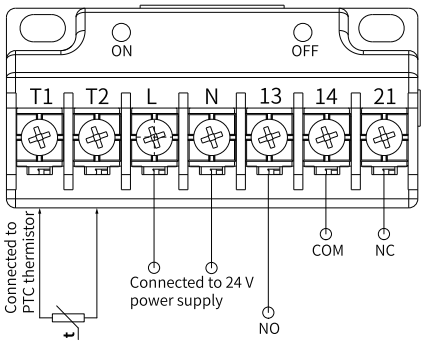
Recommended manufacturer: Dandong Keliang Electron Co., Ltd. (product model: GRB-3B-24-3; Tel: 13941536020)

Outline dimensions (for reference only)

Width x Depth x Height (mm): 68 x 33 x 53



Terminal descriptions



1. ① Open the wiring cover of the PTC temperature control module. Then, connect the power supply to terminals L and N, and connect the PTC thermistor to terminals T1 and T2.
   13: Normally open (NO) terminal;
   14: Relay common (COM) terminal, which supports circuit design based on actual conditions;
   21: Normally closed (NC) terminal
2. Connect the drain wires to terminals of the PTC temperature control module and clamp them securely.
3. After wiring is done, tighten the wiring cover of the PTC temperature control module.

Wiring method

The following two wiring methods are supported.

- Connect the module output signals to the emergency-stop DI of the drive directly.
- Connect the module output signals to the DI of the host controller.

Precautions

1. To prevent product damage, do not subject the product to violent shock during installation.
2. Keep the product away from the heat-generating device during installation to avoid damage to components caused by high temperature.
3. Install the product in the power distribution box or cabinet to prevent the product from raindrops.
4. The green signal indicator of the PTC temperature control module is steady on when the motor is in normal operation. When the motor is overheated, the red indicator is on and the green indicator is off.

5. Motors equipped with A3 encoder must be used together with a temperature control module or SV670N-PTC series drives.

4.10 Selecting Fasteners

Fasteners for flameproof enclosures of the motor must have a minimum property class of 8.8. Use fasteners with self-locking function.

5 Motor Selection

5.1 Model Selection

- Description of torque-speed characteristics curves:
  - Technical data and torque/speed characteristic values in the following tables are applicable to motors working with Inovance servo drives with the armature coil temperature being 20°C.
  - Continuous duty zone: Refers to a series of states in which the motor can operate safely and continuously. The actual torque must be located in this area.
  - Intermittent duty zone: Refers to a series of states in which the motor can run in a short time when the actual torque is greater than the rated torque.
- The characteristic values are obtained in cases where the motor is installed with the following heatsink (unit: mm):
  - MS1H4 (20B to 10C-T4, 20B to 90B-T5): 250 x 250 x 6 (aluminum)
  - MS1H3 (85B to 18C-T4, 85B to 16C-T5): 400 x 400 x 20 (steel)
  - MS1H3 (29C to 55C-T4, 29C to 44C-T5): 550 x 550 x 30 (aluminum)
  - MS1H3 (75C-T4, 55C-T5): 700 x 700 x 30 (aluminum)



The heat dissipation capacity of the motor heatsink must be equivalent to that of the standard heatsink. If the heat dissipation capacity of the heatsink installed on the explosion-protected motor is unknown, ensure that the surface temperature of the motor does not exceed the temperature class. Otherwise, an excessively high surface temperature can incur the risk of fire accidents.

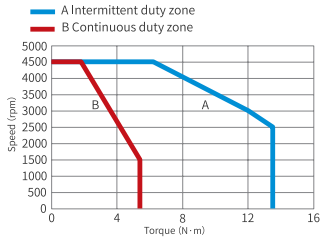
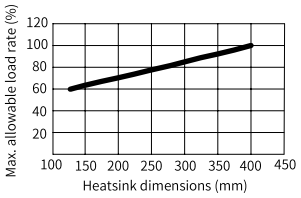
- The MS1H3 (frame sizes 130/180) series motor comes with a keyway. When the operating speed is above 3000 rpm, the motor must run with the keyway. If you need a motor that can run without a keyway at speeds higher than 3000 rpm, contact Inovance.

Note

- Values inside the parentheses in sections 5.2 to 5.3 apply to the motor with brake.
- The motor with oil seal must be derated by 10% during use.
- You need to provide a 24 VDC power supply for the brake. For the cable connecting the DC power supply to the motor brake, it is recommended to use cables with a cross sectional area of 0.2 mm^2 or above for motors with power rating 750 W or below, or use cables with a cross sectional area of 0.8 mm^2 or above for motors with power rating of 750 W or above. The brake cannot share the same power supply with other appliances to prevent the voltage or current from falling due to simultaneous operation of other electrical appliances, which may result in brake malfunction.
- Do not use a power supply for multiple brakes during use of the motor brake. Otherwise, the coil can be short-circuited after the brake is damaged due to dry friction, resulting in release failure of other brakes that connected to this power supply in parallel, which can lead to dry friction of the brake.
- The brake apply time and release time vary with the discharge circuit. Check the actual action delay of the product during use. The brake cannot be used for braking purpose.

5.2 MS1H3 Motors with Medium Inertia and Medium Capacity

5.2.1 MS1H3-85B15CD-A33*R-EX d T5

Motor specifications			Torque-Speed characteristics
Frame size (mm)	130		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	0.85		
Voltage (V)	380		
Rated torque (N·m)	5.39		
Maximum torque (N·m)	13.5		
Rated current (A)	3.5		Heatsink-based derating curve
Maximum current (A)	8.5		
Rated speed (rpm)	1500		
Maximum speed (rpm)	4500		
Torque coefficient (N·m/A)	1.84		
Rotor moment of inertia (kg·cm^2)	Motor without brake	13.56±10%	
	Motor with brake	15.8±10%	

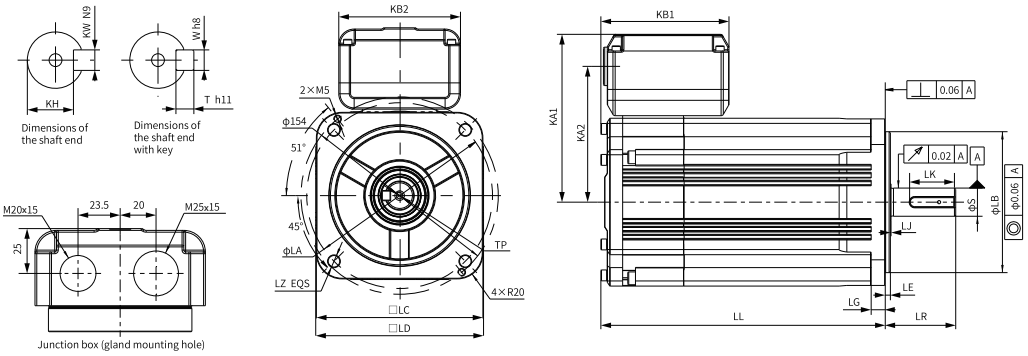
Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	≤ 120	≤ 60	≤ 1

Allowable load

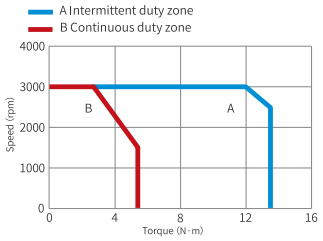
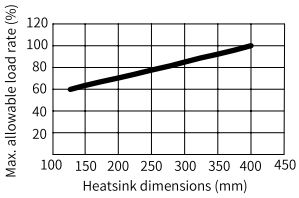
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	≤ 686	≤ 196

Product dimensions (mm)



LC	LD	LL	LR	LA	LZ	LG	LE	LJ	LB	LK
130±0.3	131±0.3	178.2±1 (192±1)	55±1	145	ϕ9 x 4	14	4	0.5±0.75	110 $h7^{0}_{-0.035}$	36
S	TP	KH	KW	W	T	KB1	KB2	KA1	KA2	Weight (kg)
22 $h6^{0}_{-0.013}$	M6x20	$18^{0}_{-0.2}$	8	8	7	100±1	95±0.5	131	106	8.2 (10.05)

5.2.2 MS1H3-85B15CD-T33*R-EX d T4

Motor specifications			Torque-Speed characteristics
Frame size (mm)	130		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	0.85		
Voltage (V)	380		
Rated torque (N·m)	5.39		
Maximum torque (N·m)	13.5		
Rated current (A)	3.5		Heatsink-based derating curve
Maximum current (A)	8.5		
Rated speed (rpm)	1500		
Maximum speed (rpm)	3000		
Torque coefficient (N·m/A)	1.84		
Rotor moment of inertia (kg·cm^2)	Motor without brake	13.56±10%	
	Motor with brake	15.8±10%	

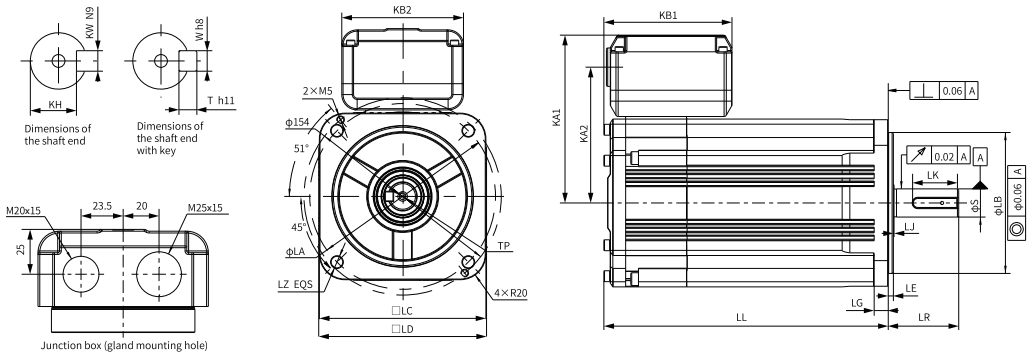
Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	≤ 120	≤ 60	≤ 1

Allowable load

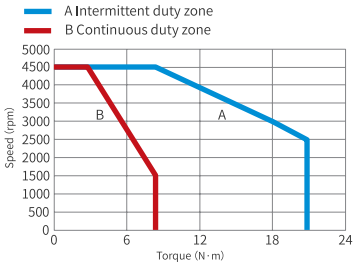
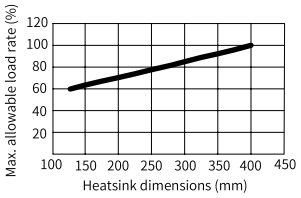
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	≤ 686	≤ 196

Product dimensions (mm)



LC	LD	LL	LR	LA	LZ	LG	LE	LJ	LB	LK
130±0.3	131±0.3	178.2±1 (192±1)	55±1	145	ϕ9 x 4	14	4	0.5±0.75	110 $h7^{0}_{-0.035}$	36
S	TP	KH	KW	W	T	KB1	KB2	KA1	KA2	Weight (kg)
22 $h6^{0}_{-0.013}$	M6x20	$18^{0}_{-0.2}$	8	8	7	100±1	95±0.5	131	106	8.2 (10.05)

5.2.3 MS1H3-13C15CD-A33*R-EX d T5

Motor specifications			Torque-Speed characteristics
Frame size (mm)	130		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	1.3		
Voltage (V)	380		
Rated torque (N·m)	8.34		
Maximum torque (N·m)	20.85		
Rated current (A)	5.1		Heatsink-based derating curve
Maximum current (A)	12.6		
Rated speed (rpm)	1500		
Maximum speed (rpm)	4500		
Torque coefficient (N·m/A)	1.85		
Rotor moment of inertia (kg·cm^2)	Motor without brake	19.25±10%	
	Motor with brake	21.5±10%	

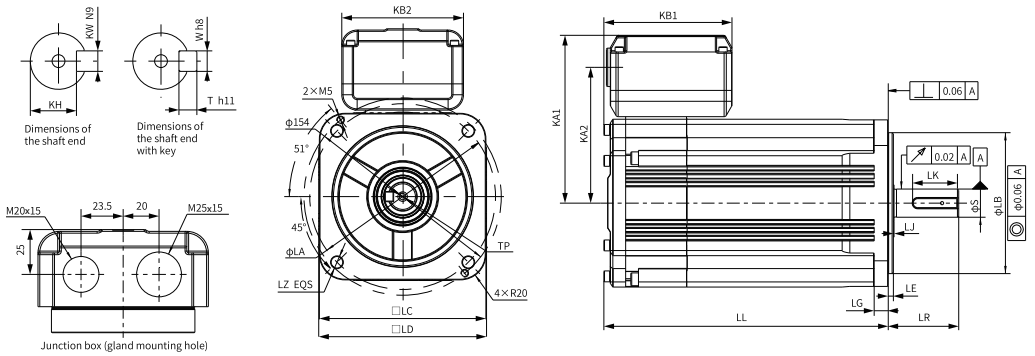
Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	≤ 120	≤ 60	≤ 1

Allowable load

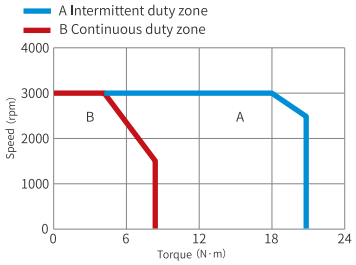
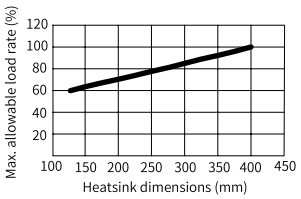
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	≤ 686	≤ 196

Product dimensions (mm)



LC	LD	LL	LR	LA	LZ	LG	LE	LJ	LB	LK
130±0.3	131±0.3	193.2±1 (207±1)	55±1	145	ϕ9 x 4	14	4	0.5±0.75	110 $h7^{0}_{-0.035}$	36
S	TP	KH	KW	W	T	KB1	KB2	KA1	KA2	Weight (kg)
22 $h6^{0}_{-0.013}$	M6x20	$18^{0}_{-0.2}$	8	8	7	100±1	95±0.5	131	106	9.7 (11.4)

5.2.4 MS1H3-13C15CD-T33*R-EX d T4

Motor specifications			Torque-Speed characteristics
Frame size (mm)	130		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	1.3		
Voltage (V)	380		
Rated torque (N·m)	8.34		
Maximum torque (N·m)	20.85		
Rated current (A)	5.1		Heatsink-based derating curve
Maximum current (A)	12.6		
Rated speed (rpm)	1500		
Maximum speed (rpm)	3000		
Torque coefficient (N·m/A)	1.85		
Rotor moment of inertia (kg·cm^2)	Motor without brake	19.25±10%	
	Motor with brake	21.5±10%	

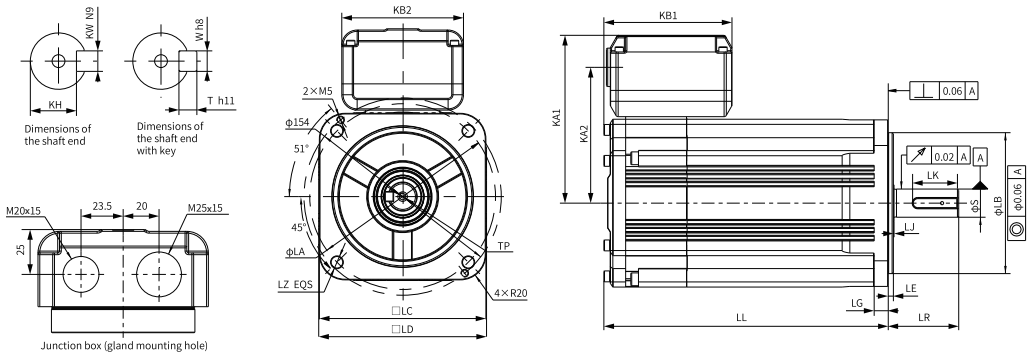
Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	≤ 120	≤ 60	≤ 1

Allowable load

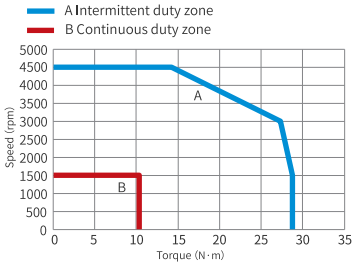
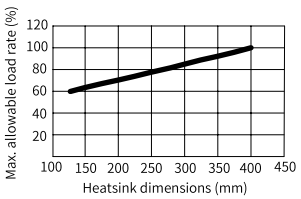
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	≤ 686	≤ 196

Product dimensions (mm)



LC	LD	LL	LR	LA	LZ	LG	LE	LJ	LB	LK
130±0.3	131±0.3	193.2±1 (207±1)	55±1	145	ϕ9 x 4	14	4	0.5±0.75	110 $h7^{0}_{-0.035}$	36
S	TP	KH	KW	W	T	KB1	KB2	KA1	KA2	Weight (kg)
22 $h6^{0}_{-0.013}$	M6x20	$18^{0}_{-0.2}$	8	8	7	100±1	95±0.5	131	106	9.7 (11.4)

5.2.5 MS1H3-16C15CD-A33*R-EX d T5

Motor specifications			Torque-Speed characteristics
Frame size (mm)	130		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	1.6		
Voltage (V)	380		
Rated torque (N·m)	10.4		
Maximum torque (N·m)	28.75		
Rated current (A)	6.08		Heatsink-based derating curve
Maximum current (A)	17.7		
Rated speed (rpm)	1500		
Maximum speed (rpm)	4500		
Torque coefficient (N·m/A)	1.87		
Rotor moment of inertia (kg·cm^2)	Motor without brake	24.9±10%	
	Motor with brake	27.2±10%	

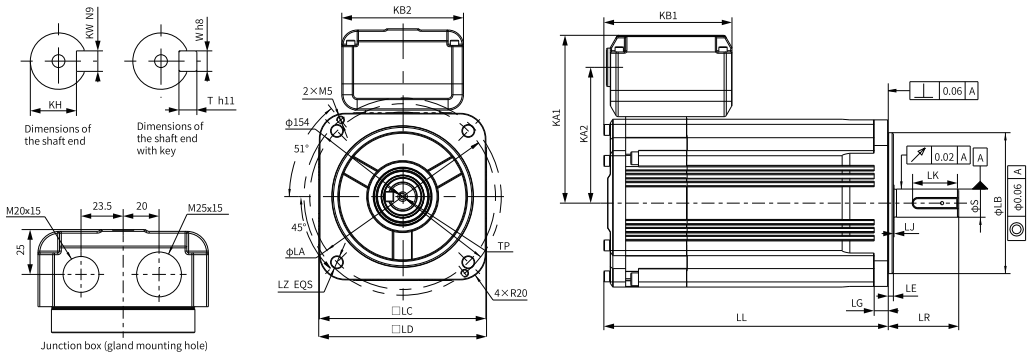
Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	≤ 120	≤ 60	≤ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	≤ 686	≤ 196

Product dimensions (mm)

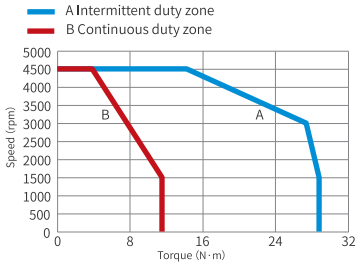


LC	LD	LL	LR	LA	LZ	LG	LE	LJ	LB	LK
130±0.3	131±0.3	208.2±1 (222±1)	55±1	145	ϕ9 x 4	14	4	0.5±0.75	110 $h7^{0}_{-0.035}$	36
S	TP	KH	KW	W	T	KB1	KB2	KA1	KA2	Weight (kg)
22 $h6^{0}_{-0.013}$	M6x20	$18^{0}_{-0.2}$	8	8	7	100±1	95±0.5	131	106	11.15 (12.8)

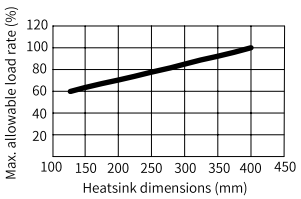
5.2.6 MS1H3-18C15CD-A33*R-EX d T4

Motor specifications		
Frame size (mm)	130	
Inertia and capacity	Medium inertia, medium capacity	
Rated power (kW)	1.8	
Voltage (V)	380	
Rated torque (N·m)	11.5	
Maximum torque (N·m)	28.75	
Rated current (A)	6.75	
Maximum current (A)	17.7	
Rated speed (rpm)	1500	
Maximum speed (rpm)	4500	
Torque coefficient (N·m/A)	1.87	
Rotor moment of inertia (kg·cm^2)	Motor without brake	24.9±10%
	Motor with brake	27.2±10%

Torque-Speed characteristics



Heatsink-based derating curve



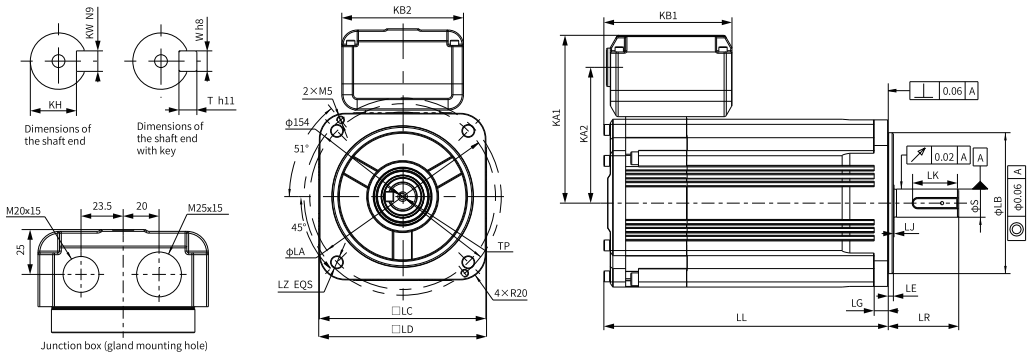
Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	≤ 120	≤ 60	≤ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	≤ 686	≤ 196

Product dimensions (mm)

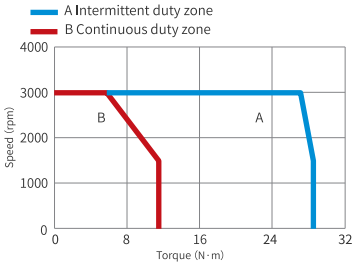


LC	LD	LL	LR	LA	LZ	LG	LE	LJ	LB	LK
130±0.3	131±0.3	208.2±1 (222±1)	55±1	145	ϕ9 x 4	14	4	0.5±0.75	110 $h7^{0}_{-0.035}$	36
S	TP	KH	KW	W	T	KB1	KB2	KA1	KA2	Weight (kg)
22 $h6^{0}_{-0.013}$	M6x20	$18^{0}_{-0.2}$	8	8	7	100±1	95±0.5	131	106	11.15 (12.8)

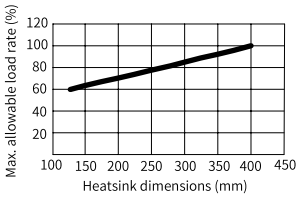
5.2.7 MS1H3-18C15CD-T33*R-EX d T4

Motor specifications		
Frame size (mm)	130	
Inertia and capacity	Medium inertia, medium capacity	
Rated power (kW)	1.8	
Voltage (V)	380	
Rated torque (N·m)	11.5	
Maximum torque (N·m)	28.75	
Rated current (A)	6.75	
Maximum current (A)	17.7	
Rated speed (rpm)	1500	
Maximum speed (rpm)	3000	
Torque coefficient (N·m/A)	1.87	
Rotor moment of inertia (kg·cm^2)	Motor without brake	24.9±10%
	Motor with brake	27.2±10%

Torque-Speed characteristics



Heatsink-based derating curve



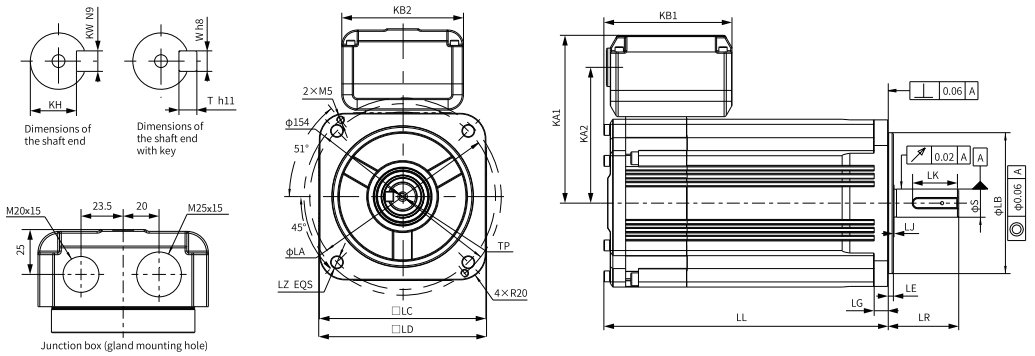
Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	≤ 120	≤ 60	≤ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	≤ 686	≤ 196

Product dimensions (mm)

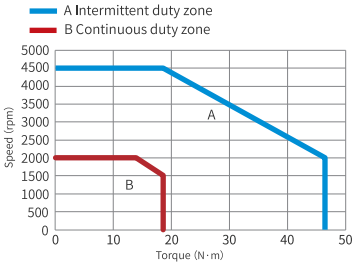


LC	LD	LL	LR	LA	LZ	LG	LE	LJ	LB	LK
130±0.3	131±0.3	208.2±1 (222±1)	55±1	145	φ9 x 4	14	4	0.5±0.75	110 $h7^{0}_{-0.035}$	36
S	TP	KH	KW	W	T	KB1	KB2	KA1	KA2	Weight (kg)
22 $h6^{0}_{-0.013}$	M6x20	$18^{0}_{-0.2}$	8	8	7	100±1	95±0.5	131	106	11.15 (12.8)

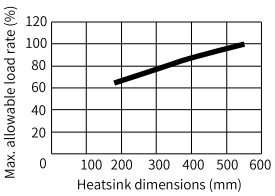
5.2.8 MS1H3-29C15CD-A33*R-EX d T5

Motor specifications		
Frame size (mm)	180	
Inertia and capacity	Medium inertia, medium capacity	
Rated power (kW)	2.6	
Voltage (V)	380	
Rated torque (N·m)	18.6	
Maximum torque (N·m)	46.5	
Rated current (A)	10.5	
Maximum current (A)	29.75	
Rated speed (rpm)	1500	
Maximum speed (rpm)	4500	
Torque coefficient (N·m/A)	1.94	
Rotor moment of inertia (kg·cm^2)	Motor without brake	44.7±10%
	Motor with brake	52.35±10%

Torque-Speed characteristics



Heatsink-based derating curve



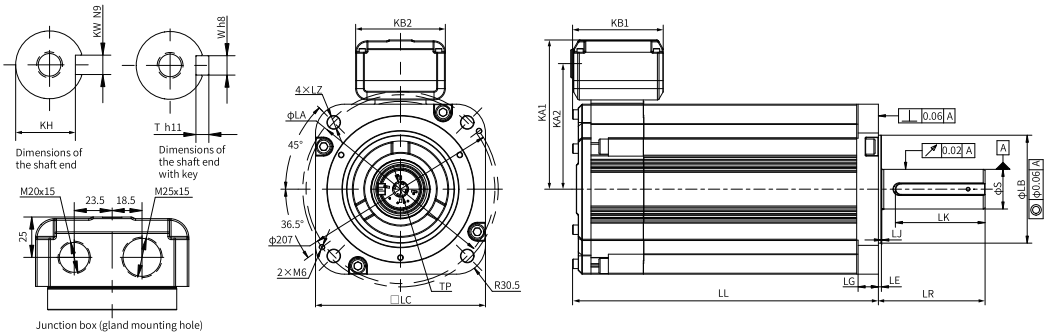
Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
50	24	31	18.58	1.29	≤ 200	≤ 100	≤ 1

Allowable load

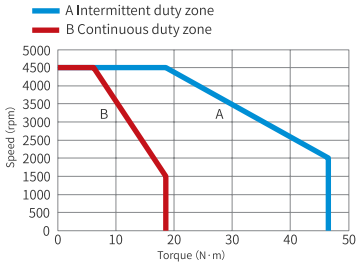
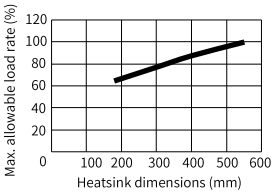
LF (mm)	Allowable radial load (N)	Allowable axial Load (N)
79	≤ 1470	≤ 490

Product dimensions (mm)



LC	LL	LR	LA	LZ	LG	LE	LJ	LB		LK
180±0.3	212.9±1 (229.9±1)	79±1	200	ϕ13.5 x 4	22	3.2±0.3	0.5±0.75	114.3 $h7^{0}_{-0.035}$		65
S	TP	KH	KW	W	T	KB1	KB2	KA1	KA2	Weight (kg)
35 $h6^{0}_{-0.16}$	M12 x 25	$30^{0}_{-0.2}$	10	10	8	96	95	158	133	19.25 (22.75)

5.2.9 MS1H3-29C15CD-A33*R-EX d T4

Motor specifications			Torque-Speed characteristics
Frame size (mm)	180		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	2.9		
Voltage (V)	380		
Rated torque (N·m)	18.6		
Maximum torque (N·m)	46.5		
Rated current (A)	10.5		Heatsink-based derating curve
Maximum current (A)	29.75		
Rated speed (rpm)	1500		
Maximum speed (rpm)	4500		
Torque coefficient (N·m/A)	1.94		
Rotor moment of inertia (kg·cm^2)	Motor without brake	44.7±10%	
	Motor with brake	52.35±10%	

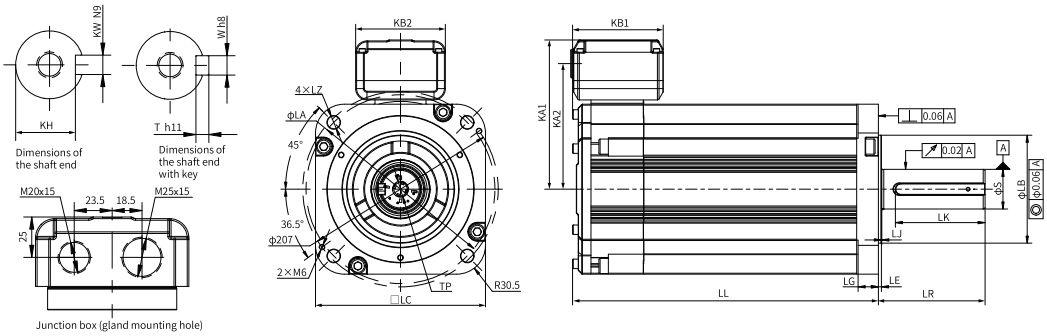
Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
50	24	31	18.58	1.29	≤ 200	≤ 100	≤ 1

Allowable load

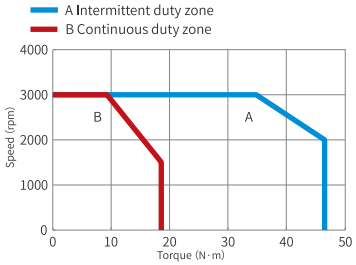
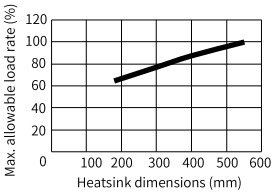
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
79	≤ 1470	≤ 490

Product dimensions (mm)



LC	LL	LR	LA	LZ	LG	LE	LJ	LB		LK
180±0.3	212.9±1 (229.9±1)	79±1	200	ϕ13.5 x 4	22	3.2±0.3	0.5±0.75	114.3 $h7^{0}_{-0.035}$		65
S	TP	KH	KW	W	T	KB1	KB2	KA1	KA2	Weight (kg)
35 $h6^{0}_{-0.16}$	M12 x 25	$30^{0}_{-0.2}$	10	10	8	96	95	158	133	19.25 (22.75)

5.2.10 MS1H3-29C15CD-T33*R-EX d T4

Motor specifications			Torque-Speed characteristics
Frame size (mm)	180		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	2.9		
Voltage (V)	380		
Rated torque (N·m)	18.6		
Maximum torque (N·m)	46.5		
Rated current (A)	10.5		Heatsink-based derating curve
Maximum current (A)	29.75		
Rated speed (rpm)	1500		
Maximum speed (rpm)	3000		
Torque coefficient (N·m/A)	1.94		
Rotor moment of inertia (kg·cm^2)	Motor without brake	44.7±10%	
	Motor with brake	52.35±10%	

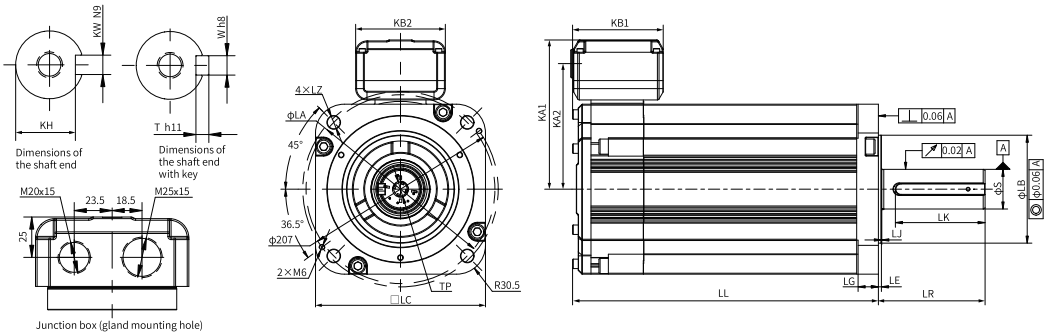
Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
50	24	31	18.58	1.29	≤ 200	≤ 100	≤ 1

Allowable load

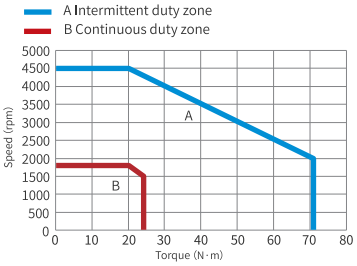
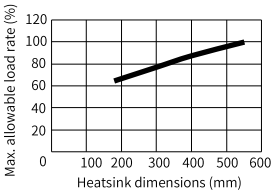
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
79	≤ 1470	≤ 490

Product dimensions (mm)



LC	LL	LR	LA	LZ	LG	LE	LJ	LB		LK
180±0.3	212.9±1 (229.9±1)	79±1	200	ϕ13.5 x 4	22	3.2±0.3	0.5±0.75	114.3 $h7^{0}_{-0.035}$		65
S	TP	KH	KW	W	T	KB1	KB2	KA1	KA2	Weight (kg)
35 $h6^{0}_{-0.16}$	M12 x 25	$30^{0}_{-0.2}$	10	10	8	96	95	158	133	19.25 (22.75)

5.2.11 MS1H3-37C15CD-A33*R-EX d T5

Motor specifications			Torque-Speed characteristics
Frame size (mm)	180		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	3.7		
Voltage (V)	380		
Rated torque (N·m)	24.2		
Maximum torque (N·m)	71.1		
Rated current (A)	13.6		Heatsink-based derating curve
Maximum current (A)	42		
Rated speed (rpm)	1500		
Maximum speed (rpm)	4500		
Torque coefficient (N·m/A)	1.96		
Rotor moment of inertia (kg·cm^2)	Motor without brake	64.9±10%	
	Motor with brake	72.55±10%	

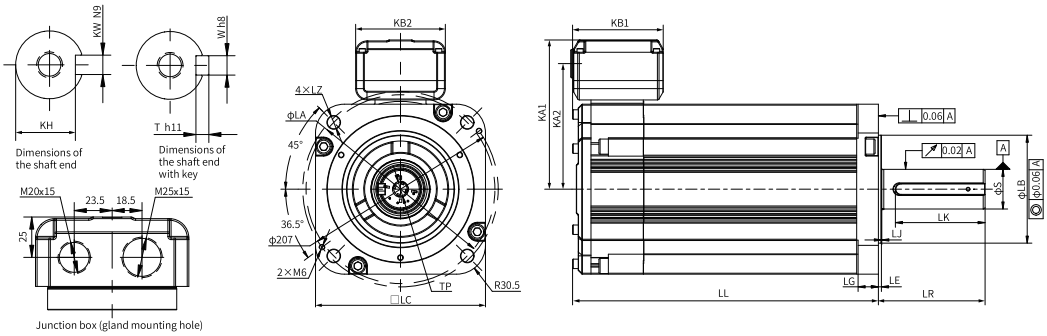
Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
50	24	31	18.58	1.29	≤ 200	≤ 100	≤ 1

Allowable load

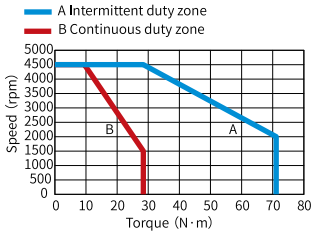
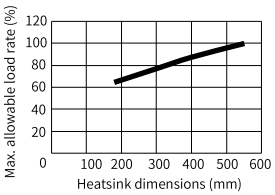
LF (mm)	Allowable radial load (N)	Allowable axial Load (N)
79	≤ 1470	≤ 490

Product dimensions (mm)



LC	LL	LR	LA	LZ	LG	LE	LJ	LB		LK
180±0.3	236.4±1 (253.4±1)	79±1	200	ϕ13.5 x 4	22	3.2±0.3	0.5±0.75	114.3 $h7^{0}_{-0.035}$		65
S	TP	KH	KW	W	T	KB1	KB2	KA1	KA2	Weight (kg)
35 $h6^{0}_{-0.16}$	M12 x 25	$30^{0}_{-0.2}$	10	10	8	96	95	158	133	22.75 (26.7)

5.2.12 MS1H3-44C15CD-A33*R-EX d T4

Motor specifications			Torque-Speed characteristics
Frame size (mm)	180		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	4.4		
Voltage (V)	380		
Rated torque (N·m)	28.4		
Maximum torque (N·m)	71.1		
Rated current (A)	16		Heatsink-based derating curve
Maximum current (A)	42		
Rated speed (rpm)	1500		
Maximum speed (rpm)	4500		
Torque coefficient (N·m/A)	1.96		
Rotor moment of inertia (kg·cm^2)	Motor without brake	64.9±10%	
	Motor with brake	72.55±10%	

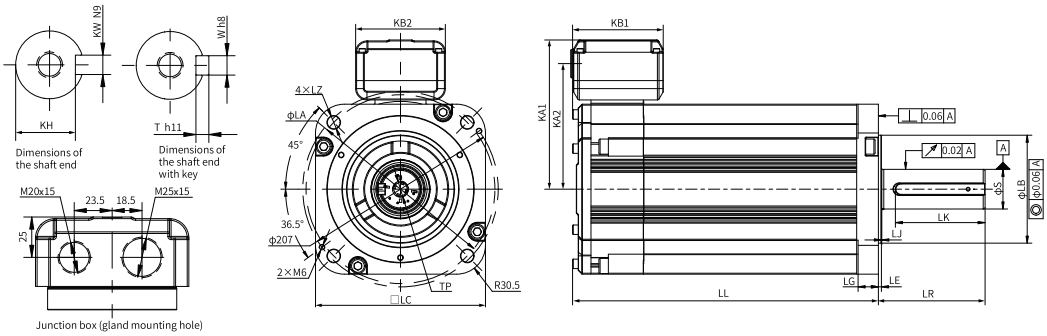
Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
50	24	31	18.58	1.29	≤ 200	≤ 100	≤ 1

Allowable load

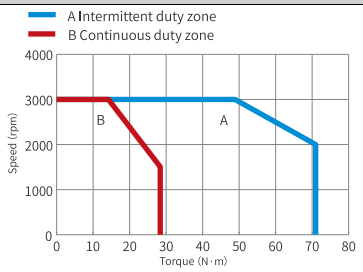
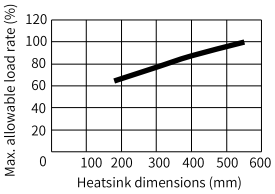
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
79	≤ 1470	≤ 490

Product dimensions (mm)



LC	LL	LR	LA	LZ	LG	LE	LJ	LB		LK
180±0.3	236.4±1 (253.4±1)	79±1	200	ϕ13.5 x 4	22	3.2±0.3	0.5±0.75	114.3 $h7^{0}_{-0.035}$		65
S	TP	KH	KW	W	T	KB1	KB2	KA1	KA2	Weight (kg)
35 $h6^{0}_{-0.16}$	M12 x 25	$30^{0}_{-0.2}$	10	10	8	96	95	158	133	22.75 (26.7)

5.2.13 MS1H3-44C15CD-T33*R-EX d T4

Motor specifications			Torque-Speed characteristics
Frame size (mm)	180		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	4.4		
Voltage (V)	380		
Rated torque (N·m)	28.4		
Maximum torque (N·m)	71.1		
Rated current (A)	16		Heatsink-based derating curve
Maximum current (A)	42		
Rated speed (rpm)	1500		
Maximum speed (rpm)	3000		
Torque coefficient (N·m/A)	1.96		
Rotor moment of inertia (kg·cm^2)	Motor without brake	64.9±10%	
	Motor with brake	72.55±10%	

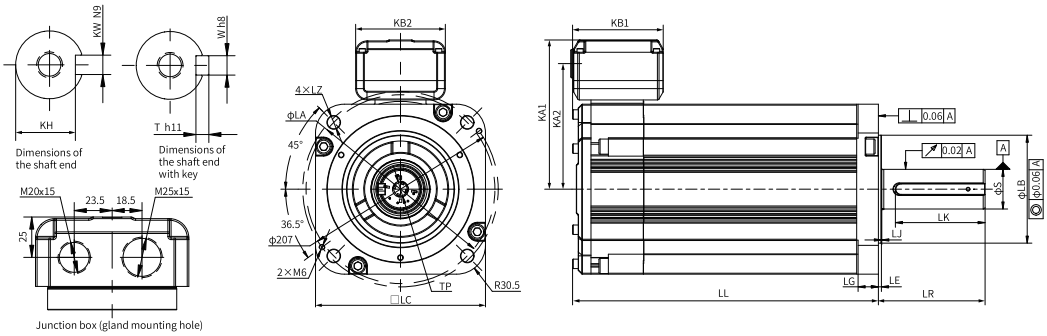
Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
50	24	31	18.58	1.29	≤ 200	≤ 100	≤ 1

Allowable load

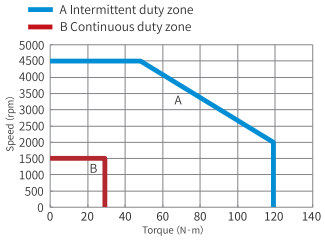
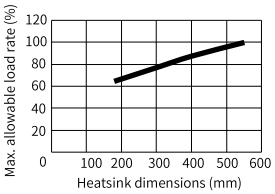
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
79	≤ 1470	≤ 490

Product dimensions (mm)



LC	LL	LR	LA	LZ	LG	LE	LJ	LB		LK
180±0.3	236.4±1 (253.4±1)	79±1	200	ϕ13.5 x 4	22	3.2±0.3	0.5±0.75	114.3 $h7^{0}_{-0.035}$		65
S	TP	KH	KW	W	T	KB1	KB2	KA1	KA2	Weight (kg)
35 $h6^{0}_{-0.16}$	M12 x 25	$30^{0}_{-0.2}$	10	10	8	96	95	158	133	22.75 (26.7)

5.2.14 MS1H3-45C15CD-A33*R-EX d T5

Motor specifications			Torque-Speed characteristics
Frame size (mm)	180		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	4.5		
Voltage (V)	380		
Rated torque (N·m)	29		
Maximum torque (N·m)	119		
Rated current (A)	15		Heatsink-based derating curve
Maximum current (A)	65		
Rated speed (rpm)	1500		
Maximum speed (rpm)	4500		
Torque coefficient (N·m/A)	2.13		
Rotor moment of inertia (kg·cm^2)	Motor without brake	127.5±10%	
	Motor with brake	135.15±10%	

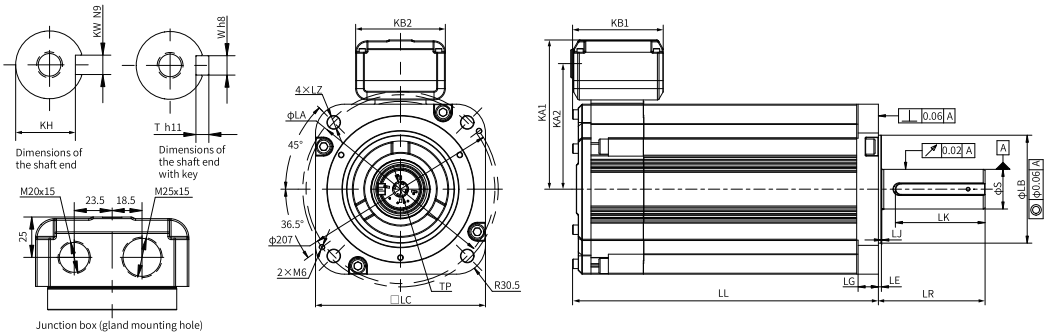
Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
50	24	31	18.58	1.29	≤ 200	≤ 100	≤ 1

Allowable load

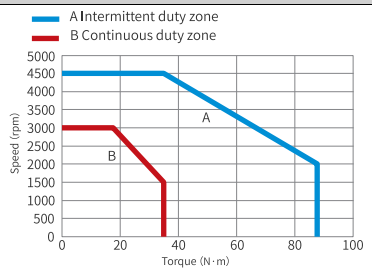
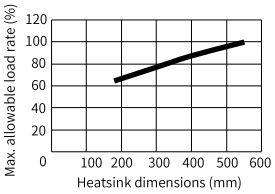
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
113	≤ 1764	≤ 588

Product dimensions (mm)



LC	LL	LR	LA	LZ	LG	LE	LJ	LB		LK
180±0.3	306.9±1 (323.9±1)	113±1	200	ϕ13.5 x 4	22	3.2±0.3	0.5±0.75	114.3 $h7^{0}_{-0.035}$		97
S	TP	KH	KW	W	T	KB1	KB2	KA1	KA2	Weight (kg)
42 $h6^{0}_{-0.16}$	M16 x 32	$37^{0}_{-0.2}$	12	12	8	96	95	158	133	34.8 (38.15)

5.2.15 MS1H3-55C15CD-A33*R-EX d T4

Motor specifications			Torque-Speed characteristics
Frame size (mm)	180		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	5.5		
Voltage (V)	380		
Rated torque (N·m)	35		
Maximum torque (N·m)	87.6		
Rated current (A)	20.7		Heatsink-based derating curve
Maximum current (A)	52		
Rated speed (rpm)	1500		
Maximum speed (rpm)	4500		
Torque coefficient (N·m/A)	1.92		
Rotor moment of inertia (kg·cm^2)	Motor without brake	86.9±10%	
	Motor with brake	94.55±10%	

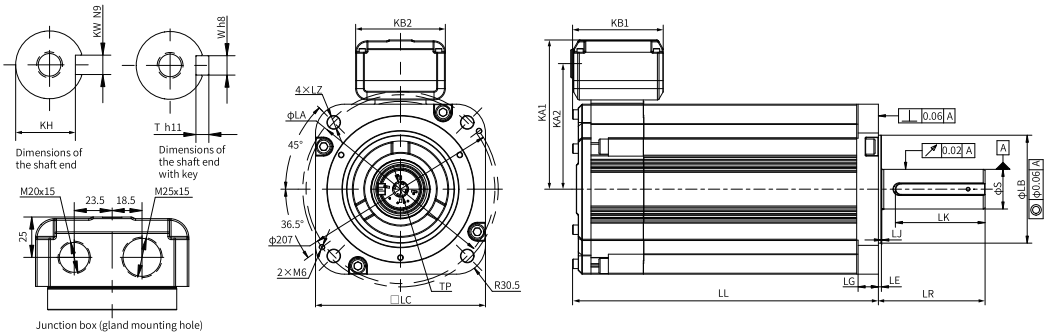
Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
50	24	31	18.58	1.29	≤ 200	≤ 100	≤ 1

Allowable load

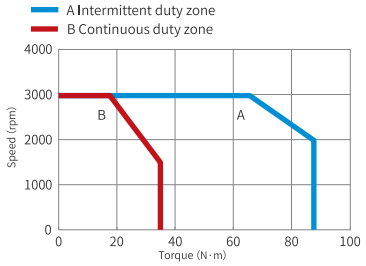
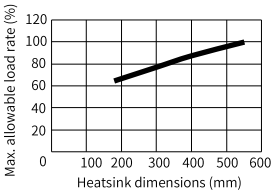
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
113	≤ 1764	≤ 588

Product dimensions (mm)



LC	LL	LR	LA	LZ	LG	LE	LJ	LB		LK
180±0.3	259.9±1 (276.9±1)	113±1	200	ϕ13.5 x 4	22	3.2±0.3	0.5±0.75	114.3 $h7^{0}_{-0.035}$		97
S	TP	KH	KW	W	T	KB1	KB2	KA1	KA2	Weight (kg)
42 $h6^{0}_{-0.16}$	M16 x 32	$37^{0}_{-0.2}$	12	12	8	96	95	158	133	27.5 (30.95)

5.2.16 MS1H3-55C15CD-T33*R-EX d T4

Motor specifications			Torque-Speed characteristics
Frame size (mm)	180		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	5.5		
Voltage (V)	380		
Rated torque (N·m)	35		
Maximum torque (N·m)	87.6		
Rated current (A)	20.7		Heatsink-based derating curve
Maximum current (A)	52		
Rated speed (rpm)	1500		
Maximum speed (rpm)	3000		
Torque coefficient (N·m/A)	1.92		
Rotor moment of inertia (kg·cm^2)	Motor without brake	86.9±10%	
	Motor with brake	94.55±10%	

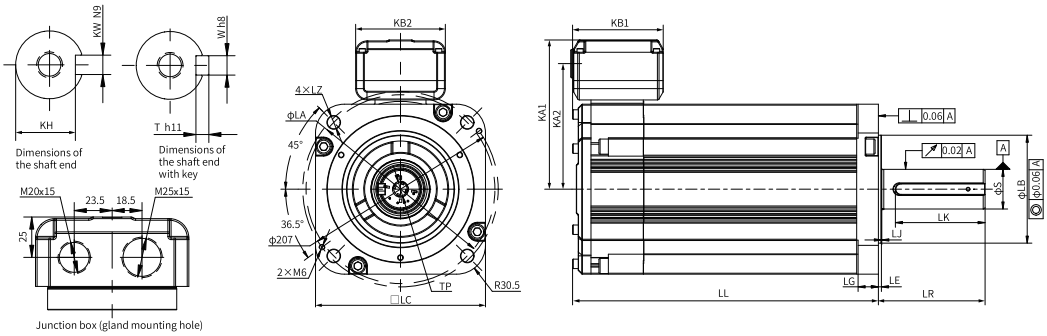
Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
50	24	31	18.58	1.29	≤ 200	≤ 100	≤ 1

Allowable load

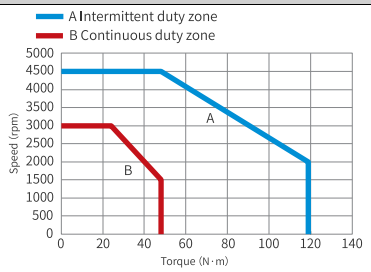
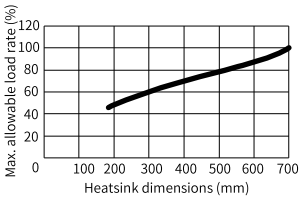
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
113	≤ 1764	≤ 588

Product dimensions (mm)



LC	LL	LR	LA	LZ	LG	LE	LJ	LB		LK
180±0.3	259.9±1 (276.9±1)	113±1	200	ϕ13.5 x 4	22	3.2±0.3	0.5±0.75	114.3 $h7^{0}_{-0.035}$		97
S	TP	KH	KW	W	T	KB1	KB2	KA1	KA2	Weight (kg)
42 $h6^{0}_{-0.16}$	M16 x 32	$37^{0}_{-0.2}$	12	12	8	96	95	158	133	27.5 (30.95)

5.2.17 MS1H3-75C15CD-A33*R-EX d T4

Motor specifications			Torque-Speed characteristics
Frame size (mm)	180		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	7.5		
Voltage (V)	380		
Rated torque (N·m)	48		
Maximum torque (N·m)	119		
Rated current (A)	25		Heatsink-based derating curve
Maximum current (A)	65		
Rated speed (rpm)	1500		
Maximum speed (rpm)	4500		
Torque coefficient (N·m/A)	2.13		
Rotor moment of inertia (kg·cm^2)	Motor without brake	127.5±10%	
	Motor with brake	135.15±10%	

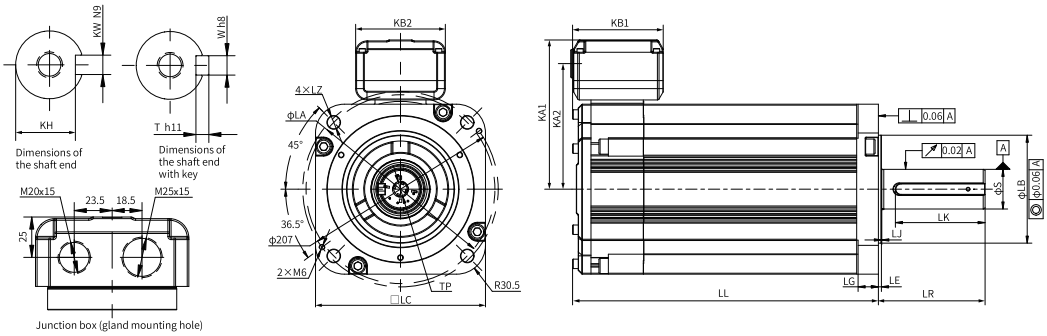
Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
50	24	31	18.58	1.29	≤ 200	≤ 100	≤ 1

Allowable load

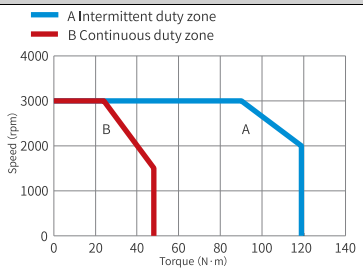
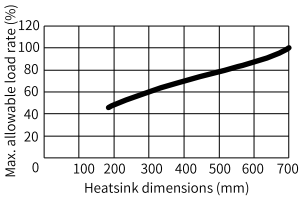
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
113	≤ 1764	≤ 588

Product dimensions (mm)



LC	LL	LR	LA	LZ	LG	LE	LJ	LB		LK
180±0.3	306.9±1 (323.9±1)	113±1	200	ϕ13.5 x 4	22	3.2±0.3	0.5±0.75	114.3 $h7^{0}_{-0.035}$		97
S	TP	KH	KW	W	T	KB1	KB2	KA1	KA2	Weight (kg)
42 $h6^{0}_{-0.16}$	M16 x 32	$37^{0}_{-0.2}$	12	12	8	96	95	158	133	34.8 (38.15)

5.2.18 MS1H3-75C15CD-T33*R-EX d T4

Motor specifications			Torque-Speed characteristics
Frame size (mm)	180		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	7.5		
Voltage (V)	380		
Rated torque (N·m)	48		
Maximum torque (N·m)	119		
Rated current (A)	25		Heatsink-based derating curve
Maximum current (A)	65		
Rated speed (rpm)	1500		
Maximum speed (rpm)	3000		
Torque coefficient (N·m/A)	2.13		
Rotor moment of inertia (kg·cm^2)	Motor without brake	127.5±10%	
	Motor with brake	135.15±10%	

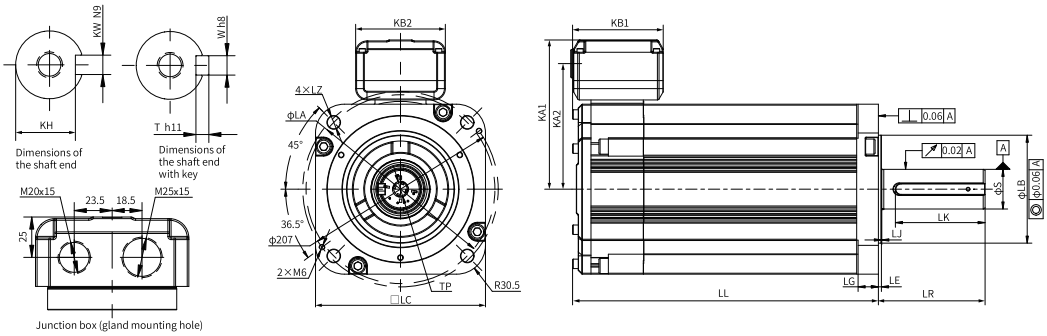
Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
50	24	31	18.58	1.29	≤ 200	≤ 100	≤ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
113	≤ 1764	≤ 588

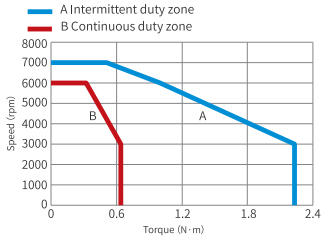
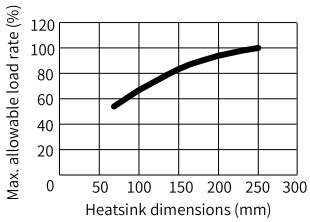
Product dimensions (mm)



LC	LL	LR	LA	LZ	LG	LE	LJ	LB		LK
180±0.3	306.9±1 (323.9±1)	113±1	200	ϕ13.5 x 4	22	3.2±0.3	0.5±0.75	114.3 $h7^{0}_{-0.035}$		97
S	TP	KH	KW	W	T	KB1	KB2	KA1	KA2	Weight (kg)
42 $h6^{0}_{-0.16}$	M16 x 32	$37^{0}_{-0.2}$	12	12	8	96	95	158	133	34.8 (38.15)

5.3 MS1H4 Motors with Medium Inertia and Small Capacity

5.3.1 MS1H4-20B30CB-A33*R-EX d T5

Motor specifications			Torque-Speed characteristics
Frame size (mm)	60		
Inertia and capacity	Medium inertia, low capacity		
Rated power (kW)	0.2		
Voltage (V)	220		
Rated torque (N·m)	0.64		
Maximum torque (N·m)	2.24		
Rated current (A)	1.3		Heatsink-based derating curve
Maximum current (A)	5.3		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.46		
Rotor moment of inertia (kg·cm^2)	Motor without brake	0.22±10%	
	Motor with brake	0.23±10%	

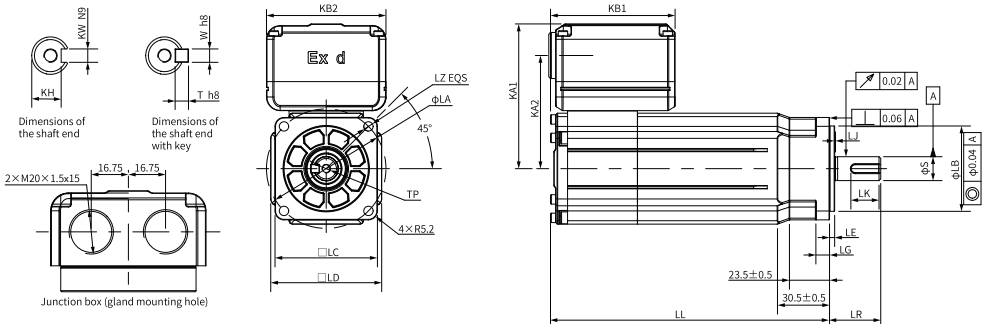
Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
1.5	24	7.6	75.79	0.32	≤ 60	≤ 20	≤ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial Load (N)
25	≤ 245	≤ 74

Product dimensions (mm)

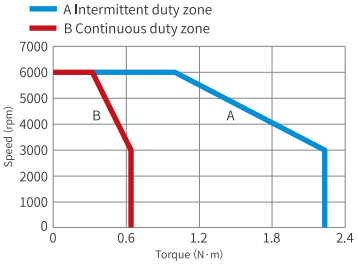


LC	LD	LL	LR	LA	LZ	LG	LE	LJ	LB	LK
60±0.3	65±0.3	127.15±1 (145.2±1)	30±0.35	70	ϕ5.5 x 4	8±0.5	3±0.3	0.5±0.35	50 $h7^{0}_{-0.025}$	16.5
S	TP	KH	KW	W	T	KB1	KB2	KA1	KA2	Weight (kg)
14	M5 x 8	$11^{0}_{-0.1}$	5	5	5	73±0.5	70±0.5	66.3±1	84.8±1	1.75 (2.1)

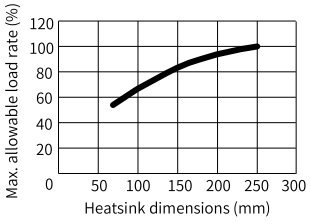
5.3.2 MS1H4-20B30CB-T33*R-EX d T4

Motor specifications		
Frame size (mm)	60	
Inertia and capacity	Medium inertia, low capacity	
Rated power (kW)	0.2	
Voltage (V)	220	
Rated torque (N·m)	0.64	
Maximum torque (N·m)	2.24	
Rated current (A)	1.3	
Maximum current (A)	5.3	
Rated speed (rpm)	3000	
Maximum speed (rpm)	6000	
Torque coefficient (N·m/A)	0.46	
Rotor moment of inertia (kg·cm^2)	Motor without brake	0.22±10%
	Motor with brake	0.23±10%

Torque-Speed characteristics



Heatsink-based derating curve



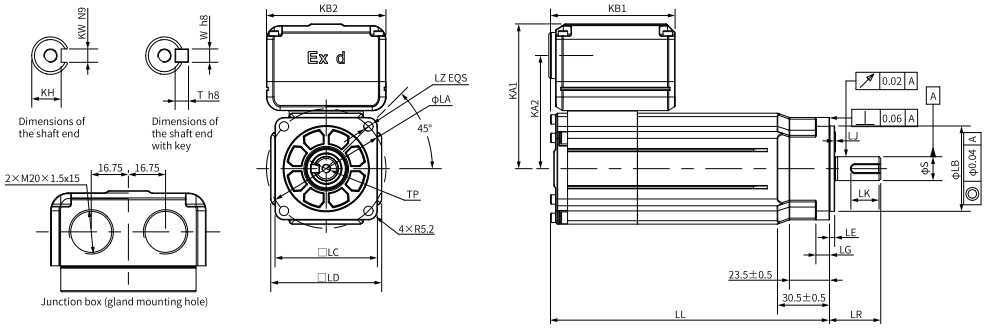
Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
1.5	24	7.6	75.79	0.32	≤ 60	≤ 20	≤ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial Load (N)
25	≤ 245	≤ 74

Product dimensions (mm)

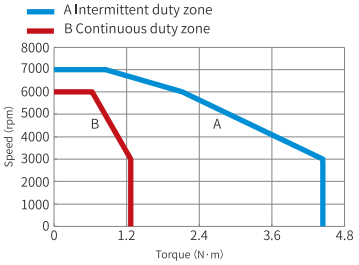


LC	LD	LL	LR	LA	LZ	LG	LE	LJ	LB	LK
60±0.3	65±0.3	127.15±1 (145.2±1)	30±0.35	70	ϕ5.5 x 4	8±0.5	3±0.3	0.5±0.35	50 $h7^{0}_{-0.025}$	16.5
S	TP	KH	KW	W	T	KB1	KB2	KA1	KA2	Weight (kg)
14	M5 x 8	$11^{0}_{-0.1}$	5	5	5	73±0.5	70±0.5	66.3±1	84.8±1	1.75 (2.1)

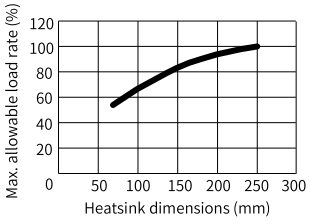
5.3.3 MS1H4-40B30CB-A33*R-EX d T5

Motor specifications		
Frame size (mm)	60	
Inertia and capacity	Medium inertia, low capacity	
Rated power (kW)	0.4	
Voltage (V)	220	
Rated torque (N·m)	1.27	
Maximum torque (N·m)	4.45	
Rated current (A)	2.4	
Maximum current (A)	9.2	
Rated speed (rpm)	3000	
Maximum speed (rpm)	7000	
Torque coefficient (N·m/A)	0.53	
Rotor moment of inertia (kg·cm^2)	Motor without brake	0.44±10%
	Motor with brake	0.45±10%

Torque-Speed characteristics



Heatsink-based derating curve



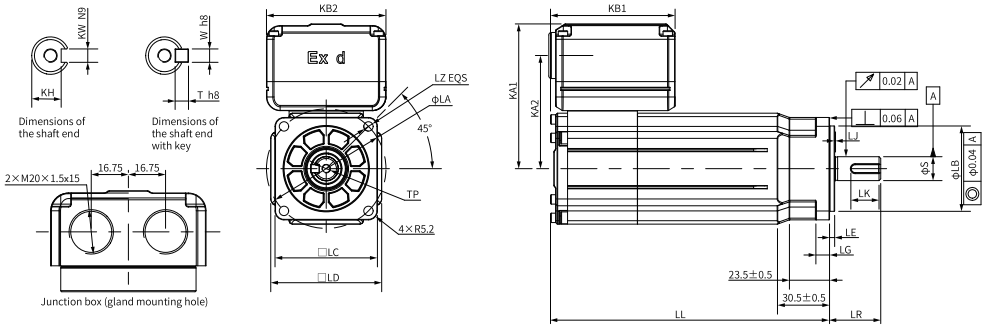
Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
1.5	24	7.6	75.79	0.32	≤ 60	≤ 20	≤ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial Load (N)
25	≤ 245	≤ 74

Product dimensions (mm)

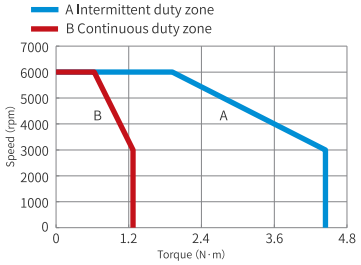


LC	LD	LL	LR	LA	LZ	LG	LE	LJ	LB	LK
60±0.3	65±0.3	145.45±1 (163.5±1)	30±0.35	70	ϕ5.5 x 4	8±0.5	3±0.3	0.5±0.35	50 $h7^{0}_{-0.025}$	16.5
S	TP	KH	KW	W	T	KB1	KB2	KA1	KA2	Weight (kg)
14	M5 x 8	$11^{0}_{-0.1}$	5	5	5	73±0.5	70±0.5	66.3±1	84.8±1	2.1 (2.45)

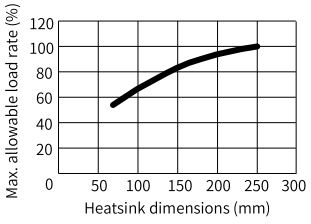
5.3.4 MS1H4-40B30CB-T33*R-EX d T4

Motor specifications		
Frame size (mm)	60	
Inertia and capacity	Medium inertia, low capacity	
Rated power (kW)	0.4	
Voltage (V)	220	
Rated torque (N·m)	1.27	
Maximum torque (N·m)	4.45	
Rated current (A)	2.4	
Maximum current (A)	9.2	
Rated speed (rpm)	3000	
Maximum speed (rpm)	6000	
Torque coefficient (N·m/A)	0.53	
Rotor moment of inertia (kg·cm^2)	Motor without brake	0.44±10%
	Motor with brake	0.45±10%

Torque-Speed characteristics



Heatsink-based derating curve



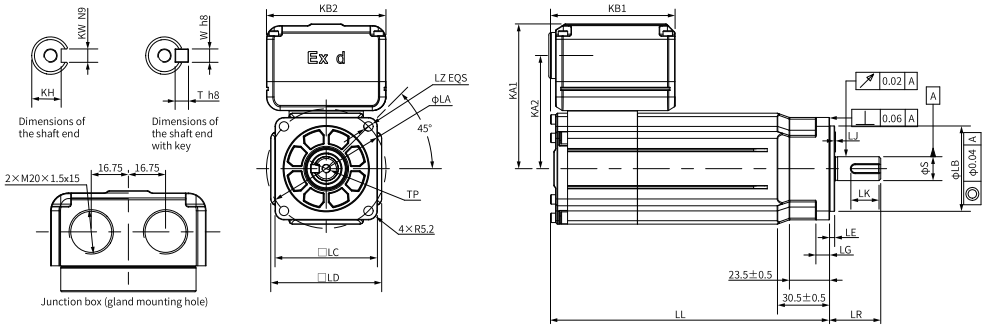
Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
1.5	24	7.6	75.79	0.32	≤ 60	≤ 20	≤ 1

Allowable load

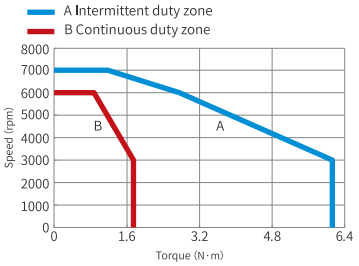
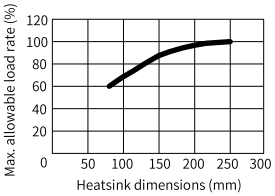
LF (mm)	Allowable radial load (N)	Allowable axial Load (N)
25	≤ 245	≤ 74

Product dimensions (mm)



LC	LD	LL	LR	LA	LZ	LG	LE	LJ	LB	LK
60±0.3	65±0.3	145.45±1 (163.5±1)	30±0.35	70	ϕ5.5 x 4	8±0.5	3±0.3	0.5±0.35	50 $h7^{0}_{-0.025}$	16.5
S	TP	KH	KW	W	T	KB1	KB2	KA1	KA2	Weight (kg)
14	M5 x 8	$11^{0}_{-0.1}$	5	5	5	73±0.5	70±0.5	66.3±1	84.8±1	2.1 (2.45)

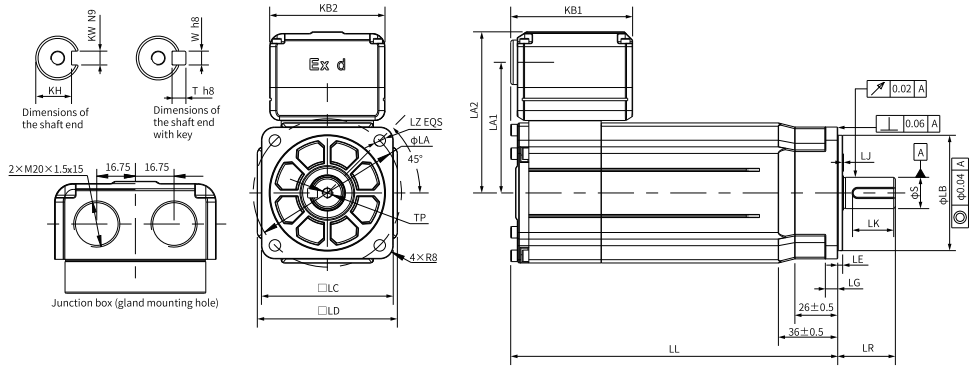
5.3.5 MS1H4-55B30CB-A331R-EX d T5

Motor specifications			Torque-Speed characteristics
Frame size (mm)	80		
Inertia and capacity	Medium inertia, low capacity		
Rated power (kW)	0.55		
Voltage (V)	220		
Rated torque (N·m)	1.75		
Maximum torque (N·m)	6.13		
Rated current (A)	3.3		Heatsink-based derating curve
Maximum current (A)	13.2		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.49		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	1.16±10%	
	Motor with brake	-	

Allowable load

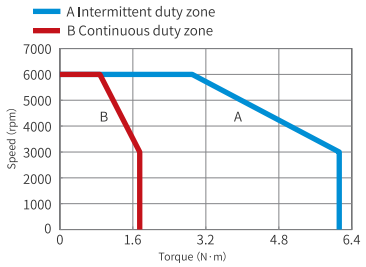
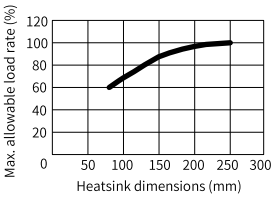
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	≤ 392	≤ 147

Product dimensions (mm)



LC	LD	LL	LR	LA	LZ	LG	LE	LJ	LB	LK
80±0.3	85±0.3	154.3±1	35±0.5	90	ϕ7 x 4	8±0.5	3±0.3	0.5±0.35	70 $h7^{0}_{-0.025}$	25
S	TP	KH	KW	W	T	KB1	KB2	KA1	KA2	Weight (kg)
19	M6x20	$15.5^{0}_{-0.1}$	6	6	6	74±0.5	70±0.5	79.3±1	97.8±1	3.35

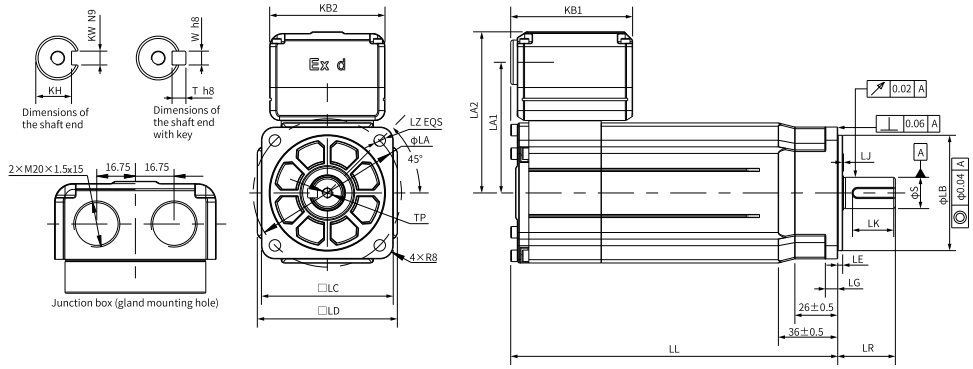
5.3.6 MS1H4-55B30CB-T331R-EX d T4

Motor specifications			Torque-Speed characteristics
Frame size (mm)	80		
Inertia and capacity	Medium inertia, low capacity		
Rated power (kW)	0.55		
Voltage (V)	220		
Rated torque (N·m)	1.75		
Maximum torque (N·m)	6.13		
Rated current (A)	3.3		Heatsink-based derating curve
Maximum current (A)	13.2		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/A)	0.49		
Rotor moment of inertia (kg·cm^2)	Motor without brake	1.16±10%	
	Motor with brake	-	

Allowable load

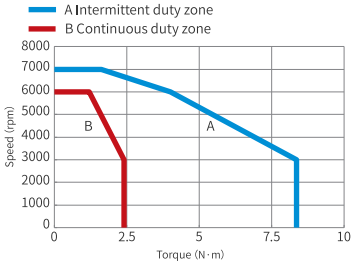
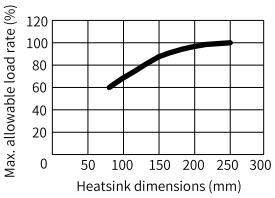
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	≤ 392	≤ 147

Product dimensions (mm)



LC	LD	LL	LR	LA	LZ	LG	LE	LJ	LB	LK
80±0.3	85±0.3	154.3±1	35±0.5	90	ϕ7 x 4	8±0.5	3±0.3	0.5±0.35	70 $h7^{0}_{-0.025}$	25
S	TP	KH	KW	W	T	KB1	KB2	KA1	KA2	Weight (kg)
19	M6x20	$15.5^{0}_{-0.1}$	6	6	6	74±0.5	70±0.5	79.3±1	97.8±1	3.35

5.3.7 MS1H4-75B30CB-A33*R-EX d T5

Motor specifications			Torque-Speed characteristics
Frame size (mm)	80		
Inertia and capacity	Medium inertia, low capacity		
Rated power (kW)	0.75		
Voltage (V)	220		
Rated torque (N·m)	2.39		
Maximum torque (N·m)	8.37		
Rated current (A)	4.4		Heatsink-based derating curve
Maximum current (A)	16.9		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.58		
Rotor moment of inertia (kg·cm^2)	Motor without brake	1.52±10%	
	Motor with brake	1.55±10%	

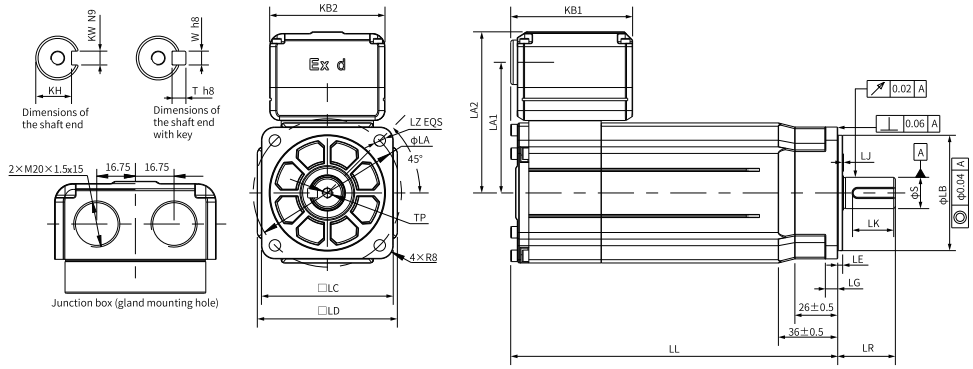
Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
3.2	24	10	57.6	0.42	≤ 60	≤ 40	≤ 1

Allowable load

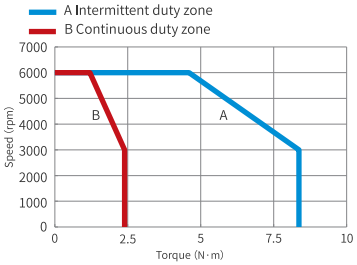
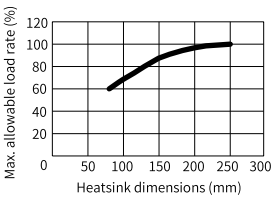
LF (mm)	Allowable radial load (N)	Allowable axial Load (N)
35	≤ 392	≤ 147

Product dimensions (mm)



LC	LD	LL	LR	LA	LZ	LG	LE	LJ	LB	LK
80±0.3	85±0.3	164.4±1 (186.6±1)	35±0.5	90	ϕ7 x 4	8±0.5	3±0.3	0.5±0.35	70 $h7^{0}_{-0.025}$	25
S	TP	KH	KW	W	T	KB1	KB2	KA1	KA2	Weight (kg)
19	M6x20	$15.5^{0}_{-0.1}$	6	6	6	74±0.5	70±0.5	79.3±1	97.8±1	3.45 (4.35)

5.3.8 MS1H4-75B30CB-T33*R-EX d T4

Motor specifications			Torque-Speed characteristics
Frame size (mm)	80		
Inertia and capacity	Medium inertia, low capacity		
Rated power (kW)	0.75		
Voltage (V)	220		
Rated torque (N·m)	2.39		
Maximum torque (N·m)	8.37		
Rated current (A)	4.4		Heatsink-based derating curve
Maximum current (A)	16.9		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/A)	0.58		
Rotor moment of inertia (kg·cm^2)	Motor without brake	1.52±10%	
	Motor with brake	1.55±10%	

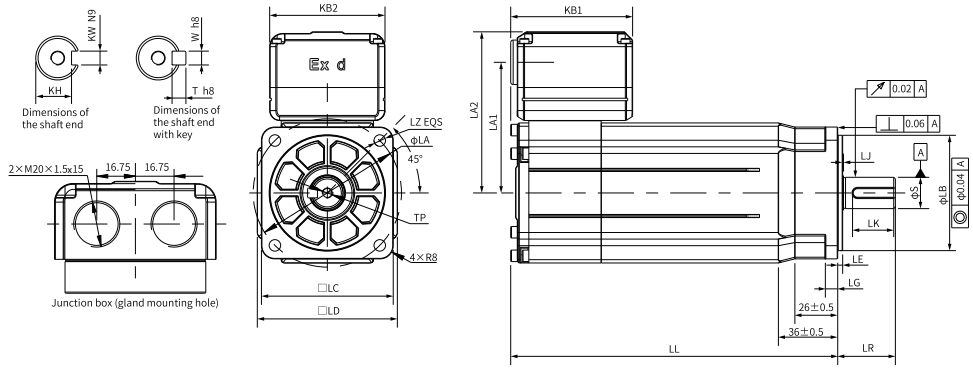
Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
3.2	24	10	57.6	0.42	≤ 60	≤ 40	≤ 1

Allowable load

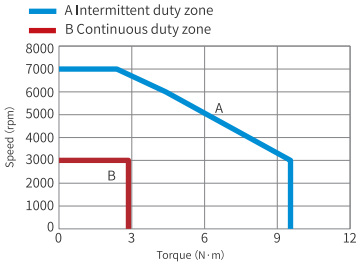
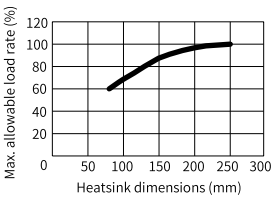
LF (mm)	Allowable radial load (N)	Allowable axial Load (N)
35	≤ 392	≤ 147

Product dimensions (mm)



LC	LD	LL	LR	LA	LZ	LG	LE	LJ	LB	LK
80±0.3	85±0.3	164.4±1 (186.6±1)	35±0.5	90	ϕ7 x 4	8±0.5	3±0.3	0.5±0.35	70 $h7^{0}_{-0.025}$	25
S	TP	KH	KW	W	T	KB1	KB2	KA1	KA2	Weight (kg)
19	M6x20	$15.5^{0}_{-0.1}$	6	6	6	74±0.5	70±0.5	79.3±1	97.8±1	3.45 (4.35)

5.3.9 MS1H4-90B30CB-A33*R-EX d T5

Motor specifications			Torque-Speed characteristics
Frame size (mm)	80		
Inertia and capacity	Medium inertia, low capacity		
Rated power (kW)	0.9		
Voltage (V)	220		
Rated torque (N·m)	2.86		
Maximum torque (N·m)	9.54		
Rated current (A)	5.85		Heatsink-based derating curve
Maximum current (A)	24		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.46		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	1.96±10%	
	Motor with brake	1.99±10%	

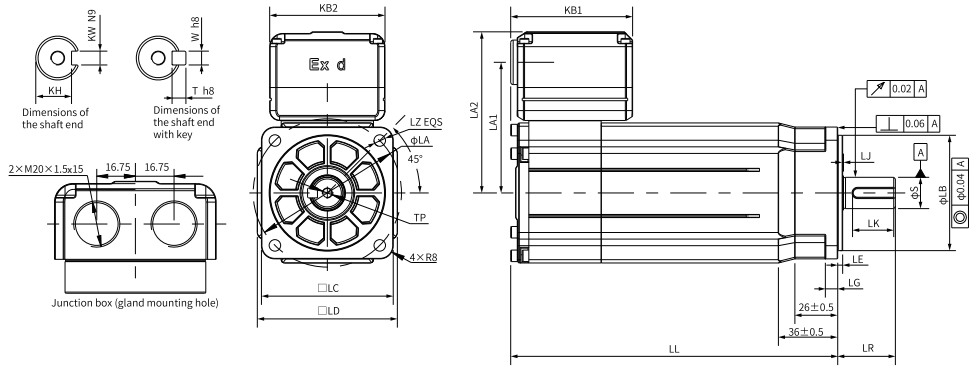
Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
3.2	24	10	57.6	0.42	≤ 60	≤ 40	≤ 1

Allowable load

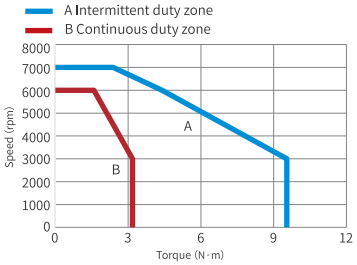
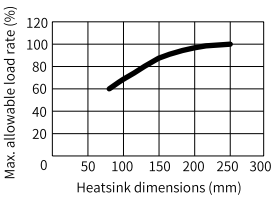
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	≤ 392	≤ 147

Product dimensions (mm)



LC	LD	LL	LR	LA	LZ	LG	LE	LJ	LB	LK
80±0.3	85±0.3	176.3±1 (198.5±1)	35±0.5	90	ϕ7 x 4	8±0.5	3±0.3	0.5±0.35	70 $h7^{0}_{-0.025}$	25
S	TP	KH	KW	W	T	KB1	KB2	KA1	KA2	Weight (kg)
19	M6x20	$15.5^{0}_{-0.1}$	6	6	6	74±0.5	70±0.5	79.3±1	97.8±1	4.15 (4.75)

5.3.10 MS1H4-10C30CB-A33*R-EX d T4

Motor specifications			Torque-Speed characteristics
Frame size (mm)	80		
Inertia and capacity	Medium inertia, low capacity		
Rated power (kW)	1.0		
Voltage (V)	220		
Rated torque (N·m)	3.18		
Maximum torque (N·m)	9.54		
Rated current (A)	6.5		Heatsink-based derating curve
Maximum current (A)	24		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.46		
Rotor moment of inertia (kg·cm^2)	Motor without brake	1.96±10%	
	Motor with brake	1.99±10%	

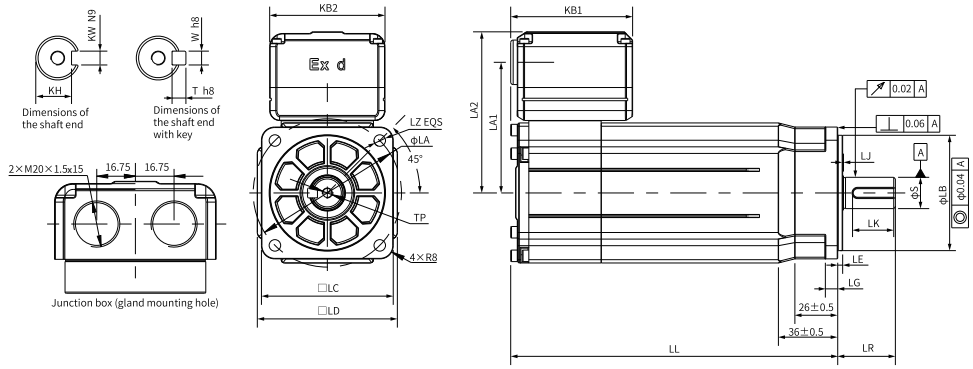
Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
3.2	24	10	57.6	0.42	≤ 60	≤ 40	≤ 1

Allowable load

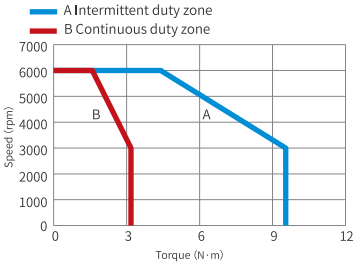
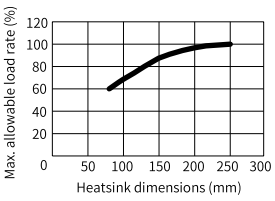
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	≤ 392	≤ 147

Product dimensions (mm)



LC	LD	LL	LR	LA	LZ	LG	LE	LJ	LB	LK
80±0.3	85±0.3	176.3±1 (198.5±1)	35±0.5	90	ϕ7 x 4	8±0.5	3±0.3	0.5±0.35	70 $h7^{0}_{-0.025}$	25
S	TP	KH	KW	W	T	KB1	KB2	KA1	KA2	Weight (kg)
19	M6x20	$15.5^{0}_{-0.1}$	6	6	6	74±0.5	70±0.5	79.3±1	97.8±1	4.15 (4.75)

5.3.11 MS1H4-10C30CB-T33*R-EX d T4

Motor specifications			Torque-Speed characteristics
Frame size (mm)	80		
Inertia and capacity	Medium inertia, low capacity		
Rated power (kW)	1.0		
Voltage (V)	220		
Rated torque (N·m)	3.18		
Maximum torque (N·m)	9.54		
Rated current (A)	6.5		Heatsink-based derating curve
Maximum current (A)	24		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/A)	0.46		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	1.96±10%	
	Motor with brake	1.99±10%	

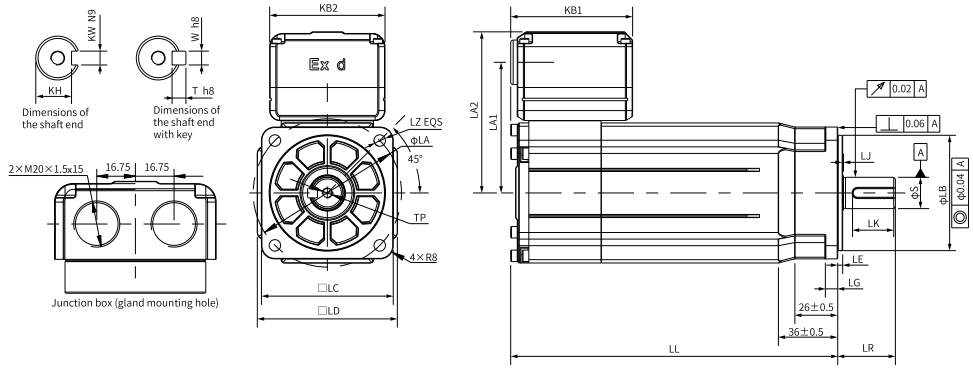
Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
3.2	24	10	57.6	0.42	≤ 60	≤ 40	≤ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	≤ 392	≤ 147

Product dimensions (mm)



LC	LD	LL	LR	LA	LZ	LG	LE	LJ	LB	LK
80±0.3	85±0.3	176.3±1 (198.5±1)	35±0.5	90	ϕ7 x 4	8±0.5	3±0.3	0.5±0.35	70 $h7^{0}_{-0.025}$	25
S	TP	KH	KW	W	T	KB1	KB2	KA1	KA2	Weight (kg)
19	M6x20	$15.5^{0}_{-0.1}$	6	6	6	74±0.5	70±0.5	79.3±1	97.8±1	4.15 (4.75)

6 Cable Selection

6.1 Model Description

Power cable model

S6-L-M ① 1 ② J ③ K ④ - 3.0 ⑤ - T ⑥

① **Cable type** S6-L-B/M: Motion control power cable B: With brake M: Without brake	③ **Cable size (mm²)** F: 14AWG x 4 J: 4C x 16AWG + 1P x 22AWG (M3) K: 4C x 16AWG + 1P x 22AWG (M5) L: 4C x 14AWG + 1P x 22AWG M: 4C x 16AWG (M3) N: 4C x 16AWG (M5)	⑤ **Cable length (m)** 3.0: 3 5.0: 5 10.0: 10
② **Connector type at drive side** 0: U-shaped cable lug 1: Pin-shaped cable lug	④ **Connector type at motor side** J: Pin-shaped cable lug K: Tube-shaped pre-insulated terminal	⑥ **Special requirements** T: Flexible cable ≥ 10 million reciprocating cycles

Encoder cable model

S6-L-P ① 1 ② 2 ③ U ④ - 3.0 ⑤ - T ⑥ - PTC ⑦

① **Cable type** S6-L-P: Motion control encoder cable	④ **Connector type at motor side** U: Pin-shaped cable lug	⑥ **Special requirements** T: Flexible cable ≥ 10 million reciprocating cycles
② **Connector type at drive side** 0: DB9 1: USB	⑤ **Cable length (m)** 3.0: 3 5.0: 5 10.0: 10	⑦ **Non-standard or brand** PTC: Temperature sensor
③ **Encoder** 2: Communication-type multi-turn absolute encoder		

Note

For selection of cables, see section ''Cable Selection List''.

6.2 Cable Type

Fixed cables

Do not bend or move fixed cables during use. Bending or moving fixed cables may damage the cables and lead to a series of cable-related faults such as poor contact. Secure fixed cables through fixed binding. Certain bending radius must be available for the cables to prevent stress.

Flexible cables

Flexible cables can move along with cable carriers without a high risk of abrasion.

Note

- Do not twist cables inside the cable carrier.
- Ensure the cable can move within the bending radius. Do not move the cables by force. Ensure a relative movement between cables or between the cable and the guiding device is available.
- Do not fix or bundle the cables inside the cable carrier. The cables can be bundled and fixed only at two unmovable ends of the cable carrier.

Oil-resistant cables

Oil-resistant cables apply to applications requiring shielded power cables, such as machine tools, cutting fluids, and cutting compounds.

More information

The R-version motor cables are the same as the cables of the previous generation of motors.

The terminal-type motor power cables and encoder cables require dedicated equipment and tooling for assembly. Order finished cables from channels authorized by Inovance.

For motor information, see the hardware guide.

6.3 Recommended Cable Specifications

The MS1-R series high-performance explosion-protected servo motors can be equipped with Inovance cables or cable entry devices that meet the specifications. The cable specifications must meet the requirements specified in this user guide and GB/T 3836.15-2017 (9.3). Select a stuffing-type cable entry device with protection level higher than or equal to the explosion protection level of the motor. Installing the cable entry device as instructed.

Table 6–1 Explosion protection mark

Gas	Ex db IIC T5/T4 Gb
Dust	Ex tb IIIC T100℃ /T135℃ Db IP67

Recommended power cables

Frame size	Cable size	Rated voltage (V)	Rated temperature (℃)
60/80	4E x 16AWG+ 1P x 22AWG	300	≥ 105
130	4E x 16AWG+ 1P x 22AWG	600	
180	4E x 10AWG+ 1P x 22AWG	600	

Recommended encoder cables

Cable size	Cable size (mm^2)	Cable resistance per unit length (Ω/km)	Allowable length (m)	Outer diameter (mm)	Rated temperature (℃)
3P x 26AWG	0.13	143	10	6.0±0.2	≥ 105
3P x 25AWG	0.16	89.4	16	6.2±0.2	
3P x 24AWG	0.2	79.6	18	6.5±0.2	
3P x 23AWG	0.26	68.5	20.9	6.8±0.2	
3P x 22AWG	0.32	54.3	26.4	7.0±0.2	
3P x 21AWG	0.41	42.7	33.5	7.3±0.2	
3P x 20AWG	0.52	33.9	42.2	7.6±0.2	
3P x 19AWG	0.57	26.9	53.2	8.5±0.2	
3P x 18AWG	0.81	21.4	66.8	8.8±0.2	
3P x 17AWG	1.03	16.3	87.7	9.7±0.2	
3P x 16AWG	1.31	13.5	105.0	11.4±0.2	

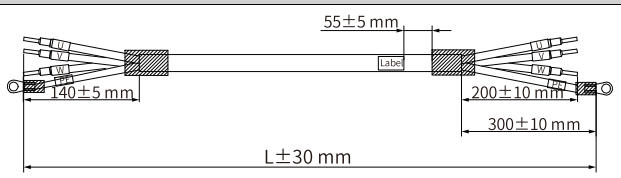
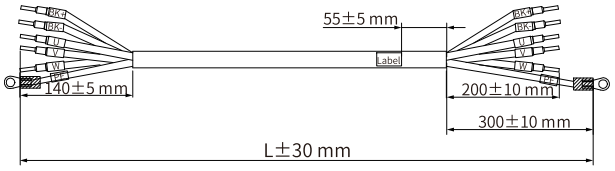
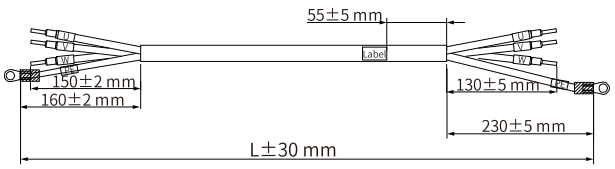
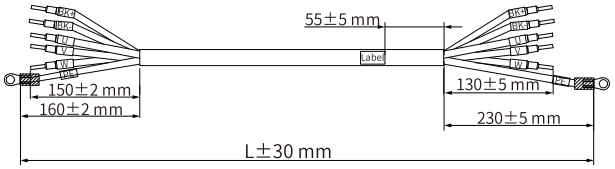
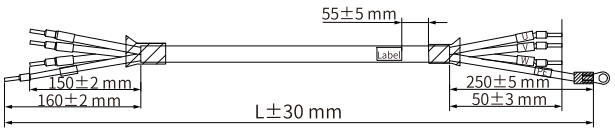
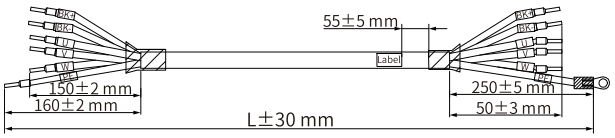
Note

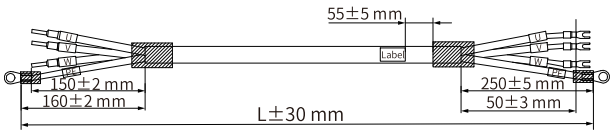
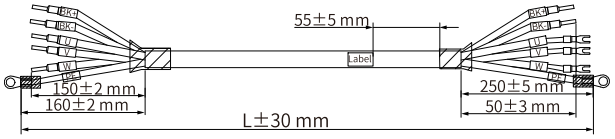
- The above length can be increased by 2 m to 3 m.
- If the cables of above 16AWG are required, contact the sales personnel of Inovance.
- In the preceding table, P refers to two twisted pairs of cables. 1P: +5V/0V twisted pair; 2P: DC+/- twisted pair; PS+/- twisted pair; 3P: +5V/0V twisted pair; DC+/- twisted pair. PS+/- twisted pair.

6.4 Cable Model List

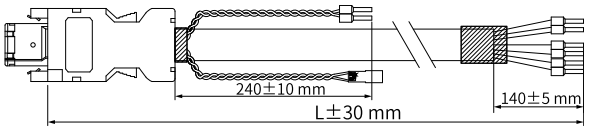
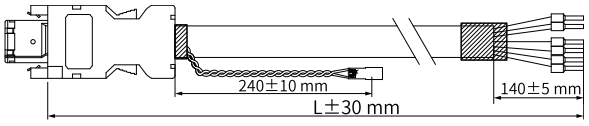
6.4.1 SV670/SV660/SV630 Series

Power cable

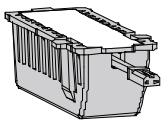
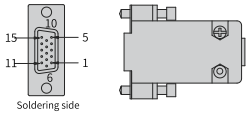
Frame size	Cable and outer diameter (mm)	Cable model	Cable length (m)	Drawing	Gland model
MS1H4	Without brake 10±0.3	S6-L-M1MJ-3.0-T	3		Exd-SSF(T)-M20-12
		S6-L-M1MJ-5.0-T	5		
		S6-L-M1MJ-10.0-T	10		
	With brake 10±0.3	S6-L-B1JK-3.0-T	3		
		S6-L-B1JK-5.0-T	5		
		S6-L-B1JK-10.0-T	10		
MS1H3 motors of 1.8 kW and below	Without brake 11±0.3	S6-L-M1NJ-3.0-T	3		Exd-SSF(T)-M25-12
		S6-L-M1NJ-5.0-T	5		
		S6-L-M1NJ-10.0-T	10		
	With brake 11±0.3	S6-L-B1KJ-3.0-T	3		
		S6-L-B1KJ-5.0-T	5		
		S6-L-B1KJ-10.0-T	10		
MS1H3 motors of 2.9 kW	Without brake Three-phase pin-shaped terminal and grounding ring terminal 13±0.3	S6-L-M1FJ-3.0-T	3		Exd-SSF(T)-M25-15
		S6-L-M1FJ-5.0-T	5		
		S6-L-M1FJ-10.0-T	10		
	With brake Three-phase pin-shaped terminal and grounding ring terminal 13±0.3	S6-L-B1LJ-3.0-T	3		
		S6-L-B1LJ-5.0-T	5		
		S6-L-B1LJ-10.0-T	10		

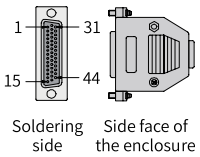
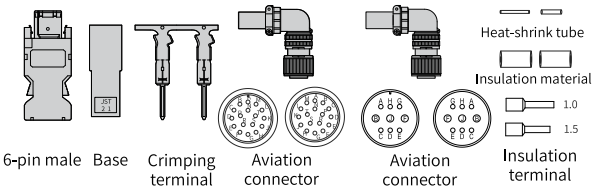
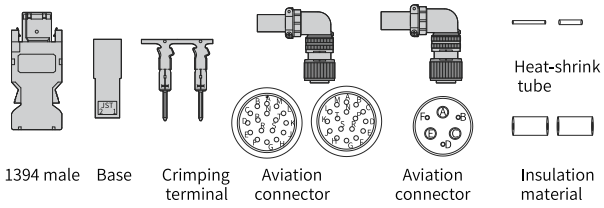
Frame size	Cable and outer diameter (mm)	Cable model	Cable length (m)	Drawing	Gland model
MS1H3 motors above 2.9 kW	Without brake Three-phase fork-shaped terminal and grounding ring terminal 13±0.3	S6-L-M4FJ-3.0-T	3		Exd-SSF(T)-M25-15
		S6-L-M4FJ-5.0-T	5		
		S6-L-M4FJ-10.0-T	10		
	With brake Three-phase fork-shaped terminal and grounding ring terminal 13±0.3	S6-L-B4LJ-3.0-T	3		
		S6-L-B4LJ-5.0-T	5		
		S6-L-B4LJ-10.0-T	10		

Encoder cable

Cable	Outer diameter (mm)	Cable model	Cable length (m)	Drawing	Gland model
Encoder cable	7.6±0.3	S6-L-P12U-3.0-T-PTC	3	 The de-energized cable length is 3250 mm.	Exd-SSF(T)-M20-08
		S6-L-P12U-5.0-T-PTC	5		
		S6-L-P12U-10.0-T-PTC	10		
		S6-L-P12U-3.0-T	3	 The de-energized cable length is 3250 mm.	
		S6-L-P12U-5.0-T	5		
		S6-L-P12U-10.0-T	10		

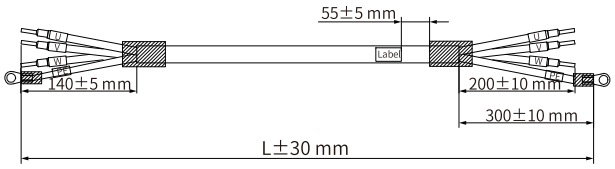
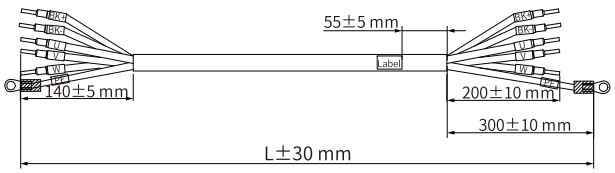
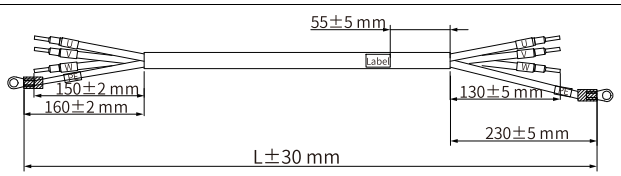
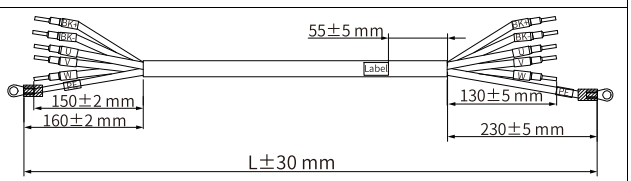
Connector kit

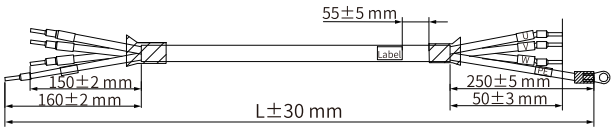
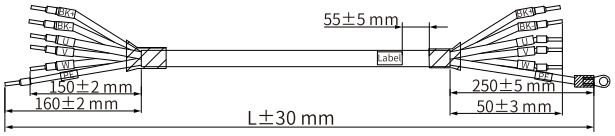
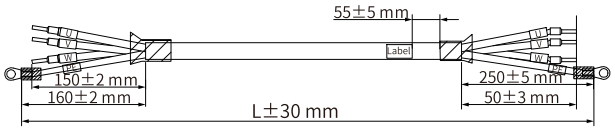
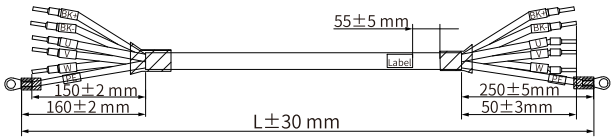
Name	Cable model	Cable length (m)	Drawing
Battery kit	S6-C4A	-	
CN1 terminal (DB15)	S6-C6	-	

Name	Cable model	Cable length (m)	Drawing
CN1 terminal (DB44) (for SV660P models)	S6-C8	-	
Connector for MS1H3 motors below 1.8 kW	S6-C29	-	
Connector for MS1H3 motors of 2.9 kW and above	S6-C39	-	

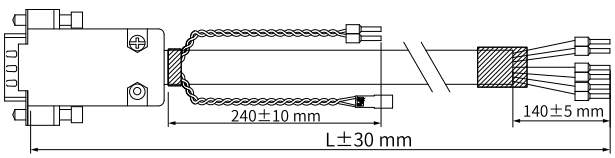
6.4.2 IS810N Series

Power cable

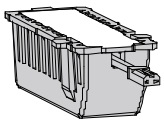
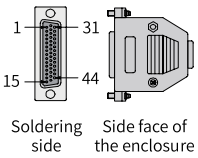
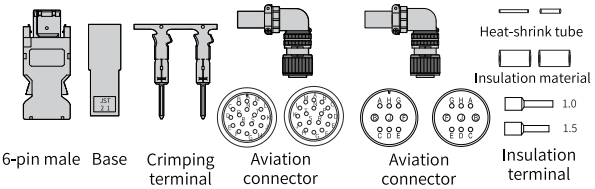
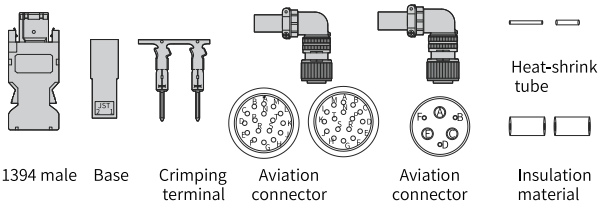
Frame size	Cable and outer diameter (mm)	Cable model	Cable length (mm)	Drawing	Gland model
MS1H4	Without brake 10±0.3	S6-L-M1MJ-3.0-T	3		Exd-SSF(T)-M20-12
		S6-L-M1MJ-5.0-T	5		
		S6-L-M1MJ-10.0-T	10		
	With brake 10±0.3	S6-L-B1JK-3.0-T	3		
		S6-L-B1JK-5.0-T	5		
		S6-L-B1JK-10.0-T	10		
MS1H3 motors of 1.8 kW and below	Without brake 11±0.3	S6-L-M1NJ-3.0-T	3		Exd-SSF(T)-M25-12
		S6-L-M1NJ-5.0-T	5		
		S6-L-M1NJ-10.0-T	10		
	With brake 11±0.3	S6-L-B1KJ-3.0-T	3		
		S6-L-B1KJ-5.0-T	5		
		S6-L-B1KJ-10.0-T	10		

Frame size	Cable and outer diameter (mm)	Cable model	Cable length (mm)	Drawing	Gland model
MS1H3 motors of 2.9 kW	Without brake Three-phase pin-shaped terminal and grounding ring terminal 13±0.3	S6-L-M1FJ-3.0-T	3		Exd-SSF(T)-M25-15
		S6-L-M1FJ-5.0-T	5		
		S6-L-M1FJ-10.0-T	10		
	With brake Three-phase pin-shaped terminal and grounding ring terminal 13±0.3	S6-L-B1LJ-3.0-T	3		
		S6-L-B1LJ-5.0-T	5		
		S6-L-B1LJ-10.0-T	10		
MS1H3 motors above 2.9 kW	Without brake Three-phase pin-shaped terminal and grounding ring terminal 13±0.3	S6-L-M3FJ-3.0-T	3		Exd-SSF(T)-M25-15
		S6-L-M3FJ-5.0-T	5		
		S6-L-M3FJ-10.0-T	10		
	With brake Three-phase pin-shaped terminal and grounding ring terminal 13±0.3	S6-L-B3LJ-3.0-T	3		
		S6-L-B3LJ-5.0-T	5		
		S6-L-B3LJ-10.0-T	10		

Encoder cable

Cable	Outer diameter (mm)	Cable model	Cable length (m)	Drawing	Gland model
Encoder cable	7.6±0.3	S6-L-P02U-3.0-T-PTC	3		Exd-SSF(T)-M20-08
		S6-L-P02U-5.0-T-PTC	5		
		S6-L-P02U-10.0-T-PTC	10	The de-energized cable length is 3250 mm.	

Connector kit

Name	Cable model	Cable length (mm)	Drawing
Battery kit	S6-C4A	-	
CN1 terminal (DB44)	S6-C8	-	
Connector for MS1H3 motors below 1.8 kW	S6-C29	-	
Connector for MS1H3 motors of 2.9 kW and above	S6-C39	-	

6.5 Wiring of Terminals

6.5.1 Wiring Assignment of Motor Terminals

Frame sizes 60/80

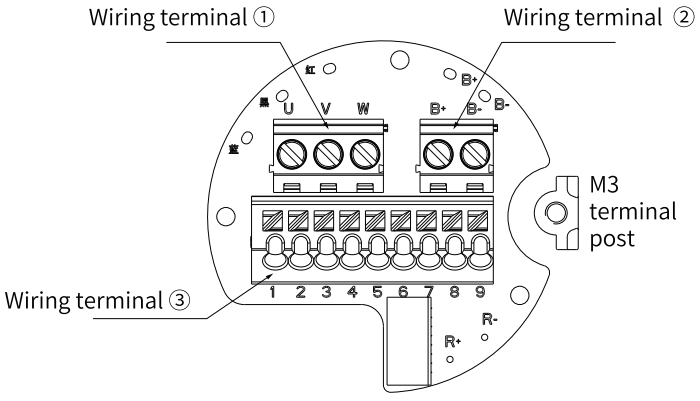


Table 6–2 Wiring assignment of power cables for motors in frame sizes 60/80

Connection position	Terminal ①			M3 terminal post	Terminal ②	
Mark on the board	U	V	W	-	B+	B-

Conductor mark	U	V	W	PE	BK+	BK-
Conductor color	Blue	Black	Red	Yellow/Green	Brown	Blue

Table 6–3 Wiring assignment of encoder cables for motors in frame sizes 60/80

Connection position	Terminal ③								
Terminal No.	1	2	3	4	5	6	7	8	9
Conductor color	Blue	Purple	Black	Brown	Red	Orange	White	Yellow	Green
Signal name	PS+	PS-	BT-	BT+	+5V	GND	PE	PTC+	PTC-

Frame sizes 130/180

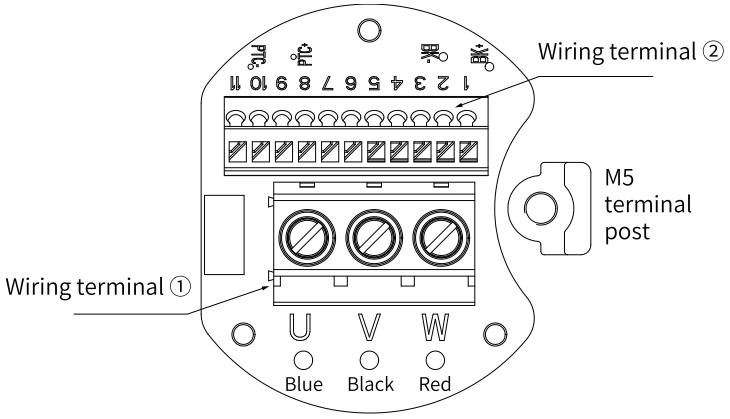


Table 6–4 Wiring assignment of power cables for motors in frame sizes 130/180

Connection position	Terminal ①			M5 terminal post	Terminal ②	
Mark on the board	U	V	W	-	1	2
Conductor mark	U	V	W	PE	BK+	BK-
Conductor color	Blue	Black	Red	Yellow/Green	Brown	Blue

Table 6–5 Wiring assignment of encoder cables for motors in frame sizes 130/180

Connection position	Terminal ②								
Terminal No.	3	4	5	6	7	8	9	10	11
Conductor color	Blue	Purple	Black	Brown	Red	Orange	White	Yellow	Green
Signal name	PS+	PS-	BT-	BT+	+5V	GND	PE	PTC+	PTC-

6.5.2 Installing the Motor Cables and Glands

Inovance MS1-R series high-performance explosion-protected servo motors in frame sizes 60/80 must be equipped with two M20x1.5 explosion-protected glands with stuffing box. Motors in frame

sizes 130/180 must be equipped with one M20x1.5 and one M25x1.5 explosion-protected glands with stuffing box. Proper stuffing is needed during use. See *"3.4 Junction Box" on page 18* for the correct stuffing method. Regular glands or threaded glands can be used as needed. The gland needed varies with the specification of the wire harness.

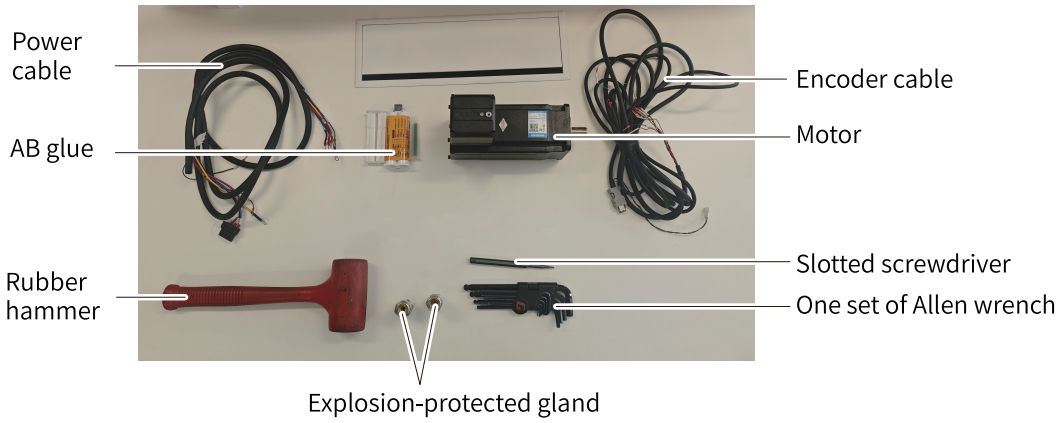
Caution

The gland purchased by the user must carry the stuffing box and features an explosion protection class equal to or higher than that of the motor. Proper stuffing is required during use. Improper stuffing can result in failure of the explosion protection function.

Tools needed

Tools and auxiliary materials needed during installation are shown below.

- Standard tools: power cables, encoder cables, explosion-protected glands, AB glue, slotted screwdriver, hex key, and rubber hammer
- Additional tools for motors in frame sizes 60/80: one M3 hex torque screwdriver and one M20 external hex torque wrench
- Additional tools for motors in frame sizes 130/180: one M4 hex torque screwdriver, one M20 external hex torque wrench, and one M25 external hex torque wrench



Installation procedure

1. Unscrew the fixing screws of the junction box cover with a hex key.



2. Remove the junction box cover slowly by pressing it vertically upwards.



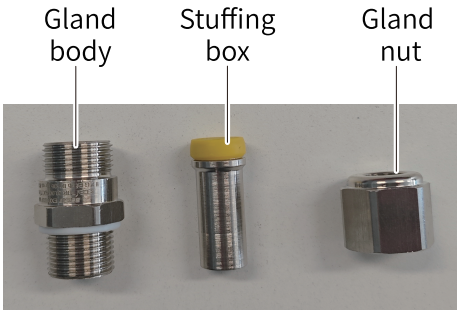


Caution

If the junction box is stuck at an angle, gently tap the junction box cover with a rubber hammer to align the junction box cover. Then slowly remove the junction box cover. Do not press in or pull out the junction box forcibly. Failure to comply can result in failure of the flameproof function due to damaged flameproof surface.



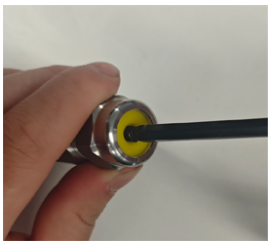
3. Disassemble the gland into three parts.



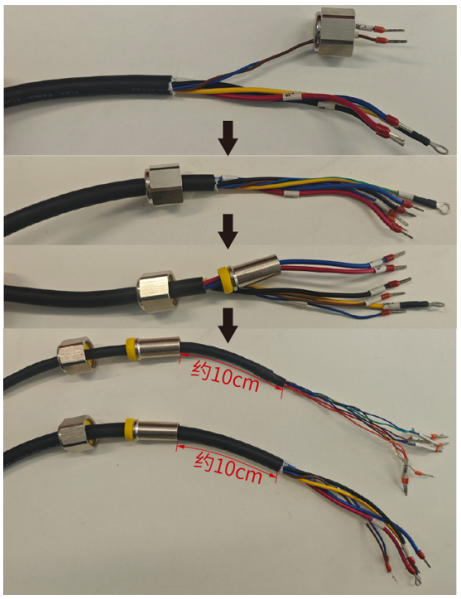
4. Install the gland body to the junction box cover first. and use the M20/M25 external hex torque wrench to calibrate the torque. For calibration torque values, see *"3.4 Junction Box" on page 18*.



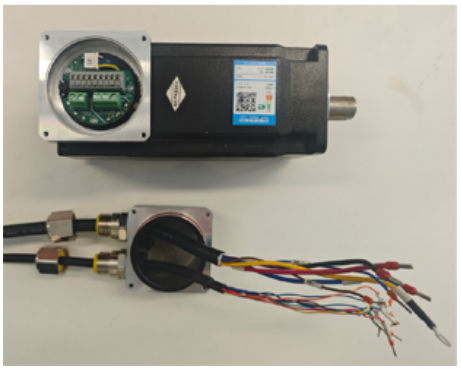
5. Use a hex wrench to prod into the dust shield of the lock nut.



6. Route the loose wires of the power cable and encoder cable through the lock nut and stuffing box. For cables with external insulation, it is recommended to reserve at least 10 cm for passing through the stuffing box.



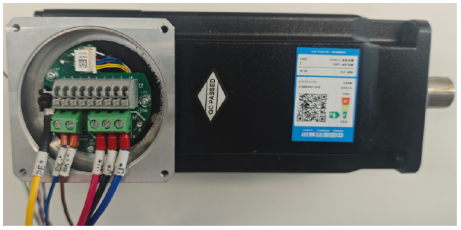
7. Route the cables to the junction box cover through the two gland bodies.



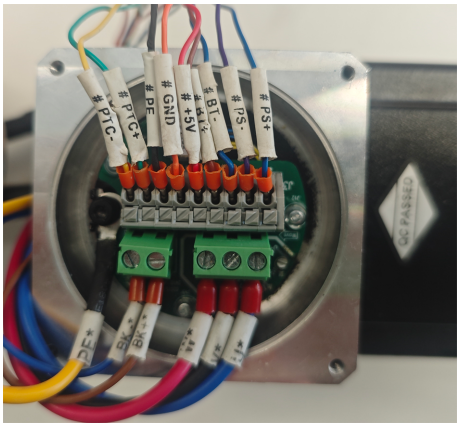
8. Unscrew the screws on the power terminals with a slotted screwdriver.



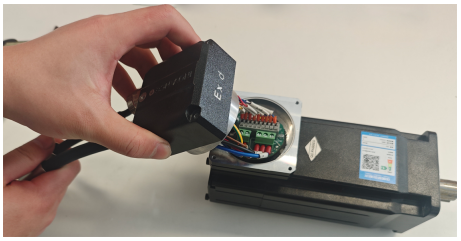
9. Tighten U/V/W/BK+/BK-/PE cables in sequence. For the wiring diagram, see *"6.5.1 Wiring Assignment of Motor Terminals" on page 71*.



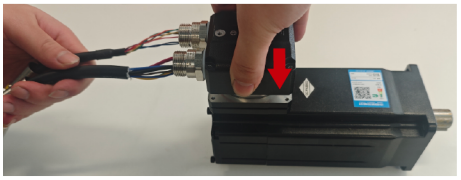
10. Use a slotted screwdriver to press the spring clamp on the encoder signal terminal, and tighten the PS +/PS-/BT-/BT+/+5V/GND/PE/PTC+/PTC- cables in sequence. For the wiring diagram, see *"6.5.1 Wiring Assignment of Motor Terminals" on page 71*.

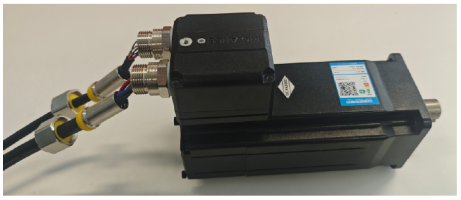


11. Pull the cable with one hand and slowly hold the junction box cover first with the other hand.

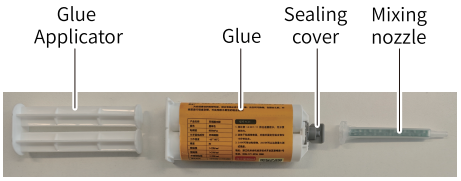


12. Slowly close the junction box cover vertically down, and pull out the redundant cables inside the junction box with proper force. If the junction boxes stuck at an angle, follow step 2.

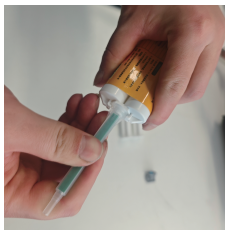




13. Take out the AB glue, unscrew the sealing cap, and install the mixing nozzle and glue applicator.

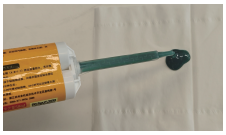


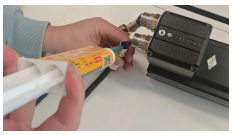


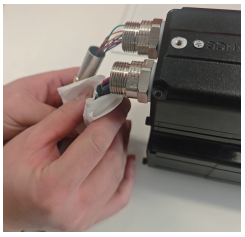


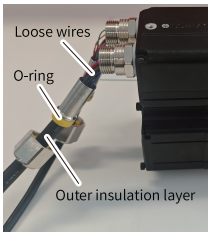


14. Slowly push the glue applicator and apply a small amount of glue to ensure even mixing and consistent glue color. Then fill the glue into the two stuffing boxes. If the glue overflows, wipe it with a piece of paper. See the amount of glue needed in *"3.4 Junction Box" on page 18*.





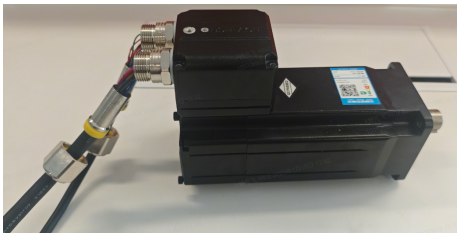




Caution

Route all the loose wires through the waterproof ring, with only the external insulation of the cable visible outside the waterproof ring. This is to prevent rubber leakage/sealing failure.

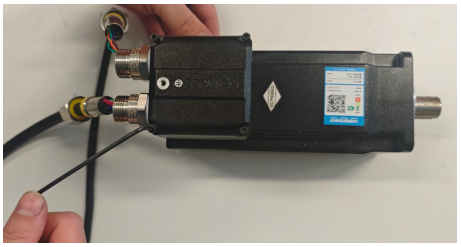
15. Wait for initial curing. For the curing conditions, see *"3.4 Junction Box" on page 18*.



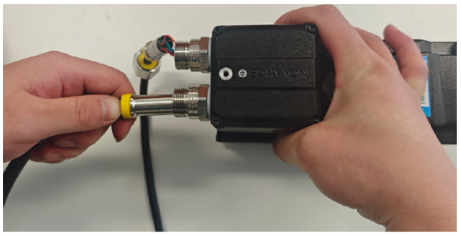
Caution

Do not perform subsequent assembly until the glue is cured. Do not pull the cable with excessive force before the glue is fully cured.

16. Tighten the fixing screws of the junction box with M3/M4 hex wrench and calibrate the torque with a torque screwdriver. See the torque calibration value in *"3.4 Junction Box" on page 18*.



17. Re-install the stuffing box, tighten the lock nut, and calibrate the torque with M20/M25 external hex torque wrench. See the torque calibration value in *"3.4 Junction Box" on page 18*.

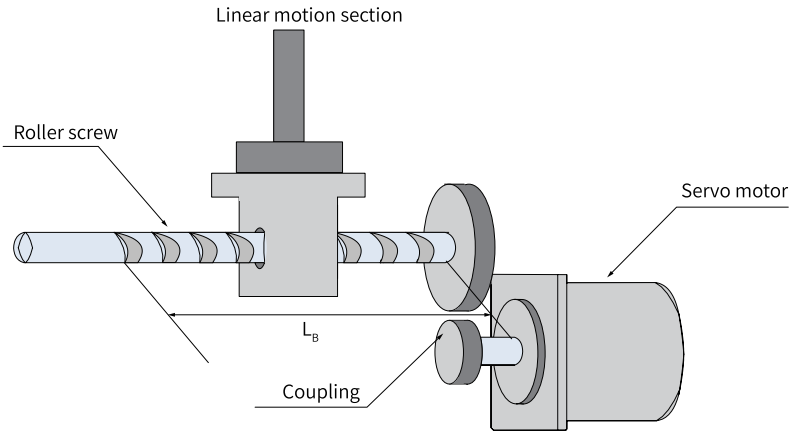






7 Servo Motor Capacity Selection

7.1 Capacity Selection Example for Position Control



Load speed (V_L) = 15 m/min

Mass of the rectilinear motion part (m): 80 kg

Roller screw length (L_B): 0.8 m

Roller screw diameter (d_B): 0.016 m

Roller screw lead (P_B): 0.005 m

Coupling mass (m_c): 0.3 kg

Coupling outer diameter (d_c): 0.03 m

Times of feeding (n): 40/min

Length of feeding (L): 0.25 m

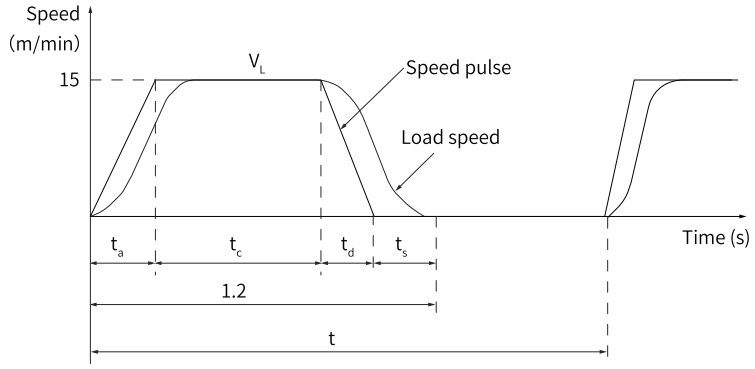
Feeding time (t_m) < 1.2s

Electrical stopping accuracy (δ) = ±0.01 mm

Friction coefficient (μ): 0.2

Mechanical efficiency (η) = 0.9 (90%)

1. **Speed diagram**



$$t = \frac{60}{n} = \frac{60}{40} = 1.5(s)$$

$$T_a = t_d, t_s = 0.1(s)$$

$$Ta = t_m - t_s - \frac{60L}{V_L} = 1.2 - 0.1 - \frac{60 \times 0.25}{15} = 0.1(s)$$

$$t_c = 1.2 - 0.1 - 0.1 \times 2 = 0.9(s)$$

2. **Speed**

- Rotational speed of the load shaft

$$n_L = \frac{V_L}{P_B} = \frac{15}{0.005} = 3000\ (\text{rpm})$$

- Rotational speed of the motor shaft

  As the coupling is directly connected, the gear ratio (1/R) is 1:1.

$$n_M = n_L \times R = 3000 \times 1 = 3000\ (\text{rpm})$$

3. **Load torque**

$$T_L = \frac{9.8\,\mu \times m \times P_B}{2\pi R \times \eta} = \frac{9.8 \times 0.2 \times 80 \times 0.005}{2\pi \times 1 \times 0.9} = 0.139\ (\text{N}\cdot\text{m})$$

4. **Load moment of inertia**

- Rectilinear motion part

$$J_{LI} = m \times \left(\frac{P_B}{2\pi R}\right)^2 = 80 \times \left(\frac{0.005}{2\pi \times 1}\right)^2 = 0.507 \times 10^{-4}\ (\text{kg}\cdot\text{m}^2)$$

- Roller screw

$$J_B = \frac{\pi}{32} P \times L_B \times d_B^4 = \frac{\pi}{32} \times 7.87 \times 10^3 \times 0.8 \times (0.016)^4 = 0.405 \times 10^{-4}(\text{kg}\cdot\text{m}^2)$$

- Coupling

$$J_C = \frac{1}{8} m_c \times d_c^4 = \frac{1}{8} \times 0.3 \times (0.03)^2 = 0.338 \times 10^{-4}(\text{kg}\cdot\text{m}^2)$$

5. **Load moving power**

$$P_O = \frac{2\pi \times n_M \times T_L}{60} = \frac{2\pi \times 3000 \times 0.139}{60} = 43.7\ (\text{W})$$

6. **Load acceleration power**

$$P_a = \left(\frac{2\pi}{60} \times n_m\right)^2 \frac{J_L}{t_a} = \left(\frac{2\pi}{60} \times n_m\right)^2 \times \frac{J_{LI} + J_B + J_C}{t_a}$$

$$= \left(\frac{2\pi}{60} \times 3000\right)^2 \times \frac{1.25 \times 10^{-4}}{0.1} = 123.4\ (\text{W})$$

7. **Temporary settings of the servo motor**

- Selection condition

  $T_L \leq$ Rated torque of the motor

  $P_a + P_o =$ (1 to 2) x Rated output of the motor

  $n_M \leq$ Rated speed of the motor

  $J_L \leq$ Allowable load moment of inertia of the servo unit

  Perform the following provisional selections according to preceding conditions:

  Servo motor: MS1H1-20B30CB-A630R

  Servo drive: SV670PS1R6I

- Specifications of the servo motor and servo drive

Rated output: 200 (W)

Rated speed: 3000 (rpm)

Rated torque: 0.64 (N·m)

Maximum instantaneous torque: 1.95 (N·m)

Rotor moment of inertia: 0.082×10^{-4} ($kg \cdot m^2$)

Allowable load moment of inertia: 1.64×10^{-4} ($kg \cdot m^2$)

Number of encoder pulses: 67108864 (P/R)

8. **Confirmation of the servo motor selected temporarily**

Confirm the startup torque required

$$T_p = \frac{2\pi \times n_M \times (J_M + J_L)}{60 \times t_a} + T_L = \frac{2\pi \times 3000 \times (0.082 + 1.25) \times 10^{-4}}{60 \times 0.1} + 0.139$$

$= 0.557\ (N \cdot m) <$ Max. instantaneous torque...Satisfactory

Confirm the braking torque required

$$T_s = \frac{2\pi \times n_M \times (J_M + J_L)}{60 \times t_a} - T_L = \frac{2\pi \times 3000 \times (0.082 + 1.25) \times 10^{-4}}{60 \times 0.1} - 0.139$$

$= 0.279(N \cdot m) <$ Max. instantaneous torque...Satisfactory

Confirm the effective torque value

$$T_{rms} = \sqrt{\frac{T_p^2 \times t_a + T_L^2 \times t_c + T_s^2 \times t_d}{t}}$$

$$= \sqrt{\frac{(0.557)^2 \times 0.1 + (0.139)^2 \times 0.9 + (0.279)^2 \times 0.1}{1.5}}$$

$= 0.19\ (N \cdot m) <$ Rated torque...Satisfactory

The capacities of the servo motor and servo drive selected temporarily based on preceding steps are available for use. The position control analysis is as follows.

9. **Electronic gear ratio (B/A)**

The electrical stopping precision (δ) is ±0.01 mm, so the position detection unit (△L) is 0.01 mm/pulse.

$$\frac{P_B}{\Delta L} \times \frac{B}{A} = \frac{5}{0.01} \times \frac{B}{A} = 67108864$$

$$\frac{B}{A} = \frac{67108864 \times 0.01}{5} = \frac{67108864}{500}$$

10. **Reference pulse frequency**

$$v_s = \frac{1000 \times V_L}{60 \times \Delta L} = \frac{1000 \times 15}{60 \times 0.01} = 25000\ (pps)$$

11. **Offset counter droop pulse**

- Set the position loop gain (Kp) to 30 (I/s).

$$\varepsilon = \frac{V_s}{K_p} = \frac{25000}{30} = 833\ (pulse)$$

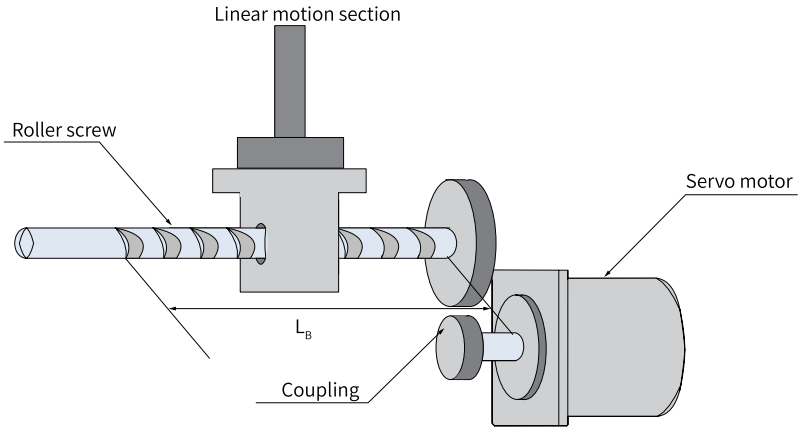
- Electrical stopping precision

$$\pm\Delta\varepsilon = \pm\frac{\varepsilon}{(\text{Servo drive control range}) \times \frac{n_M}{n_R}} = \pm\frac{833}{5000 \times \frac{3000}{3000}}$$

$$= \pm 0.17 < \pm 1\ (\text{pulse}) \pm 0.01\ (\text{mm/pulse})$$

By observing preceding steps, the servo motor and servo drive selected temporarily for position control are available for use.

7.2 Capacity Selection Example for Speed Control



Load speed (V_L) = 15 m/min

Mass of the rectilinear motion part (m): 80 kg

Roller screw length (L_B): 0.8 m

Roller screw diameter (d_B): 0.04 m

Roller screw lead (P_B): 0.01 m

Coupling mass (m_c): 1 kg

Coupling outer diameter (d_c): 0.06 m

Times of feeding (n): 40/min

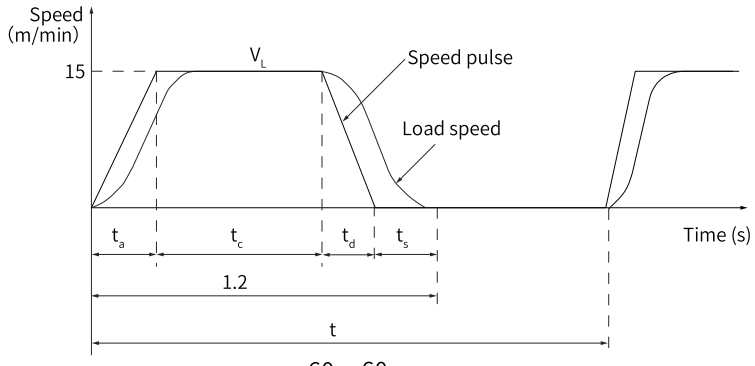
Length of feeding (L): 0.25 m

Feeding time (t_m) < 1.2s

Friction coefficient (μ): 0.2

Mechanical efficiency (η) = 0.9 (90%)

1. **Speed diagram**



$$t = \frac{60}{n} = \frac{60}{40} = 1.5(s)$$

Set t_a to the same value as t_d.

$$t_a = t_m - t_s - \frac{60 \times L}{V_L} = 1.2 - 0.1 - \frac{60 \times 0.25}{15} = 0.1(s)$$

$$t_c = 1.2 - 0.1 - 0.1 \times 2 = 0.9(s)$$

2. **Speed**

- Rotational speed of the load shaft

$$n_L = \frac{V_L}{P_B} = \frac{15}{0.01} = 1500 \text{ (rpm)}$$

- Rotational speed of the motor shaft

  As the coupling is directly connected, the gear ratio (1/R) is 1:1.

$$n_M = n_L \times R = 1500 \times 1 = 1500 \text{ (rpm)}$$

3. Load torque

$$T_L = \frac{9.8 \mu \times m \times P_B}{2\pi \times R \times \eta} = \frac{9.8 \times 0.2 \times 80 \times 0.01}{2\pi \times 1 \times 0.9} = 0.277 \text{ (N·m)}$$

4. **Load moment of inertia**

- Rectilinear motion part

$$J_{LI} = m \times \left(\frac{P_B}{2\pi R}\right)^2 = 80 \times \left(\frac{0.01}{2\pi \times 1}\right)^2 = 2.02 \times 10^{-4} (kg \cdot m^2)$$

- Roller screw

$$J_B = \frac{\pi}{32} P \times L_B \times d_B^4 = \frac{\pi}{32} \times 7.87 \times 10^3 \times 1.4 \times (0.04)^4 = 27.7 \times 10^{-4} (kg \cdot m^2)$$

- Coupling

$$J_C = \frac{1}{8} m_c \times d_c^4 = \frac{1}{8} \times 1 \times (0.06)^2 = 4.5 \times 10^{-4} (kg \cdot m^2)$$

5. **Load moving power**

$$P_O = \frac{2\pi \times n_M \times T_L}{60} = \frac{2\pi \times 1500 \times 0.277}{60} = 43.6 \text{ (W)}$$

6. **Load acceleration power**

$$P_a = \left(\frac{2\pi}{60} \times n_m\right)^2 \times \frac{J_L}{t_a} = \left(\frac{2\pi}{60} \times n_m\right)^2 \times \frac{J_C + J_B + J_{LI}}{t_a}$$

$$= \left(\frac{2\pi}{60} \times 1500\right)^2 \times \frac{34.22 \times 10^{-4}}{0.1} = 844 \text{ (W)}$$

7. **Temporary settings of the servo motor**

- Selection condition

  $T_L \leq$ Rated torque of the motor

  $P_a + P_o =$ (1 to 2) x Rated output of the motor

  $n_M \leq$ Rated speed of the motor

  $J_L \leq$ Allowable load moment of inertia of the servo unit

Perform the following provisional selections according to preceding conditions:

Servo motor: MS1H4-75B30CB-A630R

Servo drive: SV670PS5R5I

- Specifications of the servo motor and servo drive
  Rated output: 750 (W)

  Rated speed: 3000 (rpm)

  Rated torque: 2.39 (N·m)

  Maximum instantaneous torque: 8.365 (N·m)

  Rotor moment of inertia: 1.38×10^{-4} (kg·m²)

  Allowable load moment of inertia: 69.58×10^{-4} (kg·m²)

8. **Confirmation of the servo motor selected temporarily**

Confirm the startup torque required

$$T_p = \frac{2\pi \times n_M \times (J_M + J_L)}{60 \times t_a} + T_L = \frac{2\pi \times 1500 \times (1.38 + 34.22) \times 10^{-4}}{60 \times 0.1} + 0.277$$

$= 5.87\ (N \cdot m) <$ Max. instantaneous torque...Satisfactory

Confirm the braking torque required

$$T_s = \frac{2\pi \times n_M \times (J_M + J_L)}{60 \times t_a} - T_L = \frac{2\pi \times 1500 \times (1.38 + 34.22) \times 10^{-4}}{60 \times 0.1} - 0.277$$

$= 5.32\ (N \cdot m) <$ Max. instantaneous torque...Satisfactory

Confirm the effective torque value

$$T_{rms} = \sqrt{\frac{T_p^2 \times t_a + T_L^2 \times t_c + T_s^2 \times t_d}{t}}$$

$$= \sqrt{\frac{(5.87)^2 \times 0.1 + (0.277)^2 \times 0.9 + (5.32)^2 \times 0.1}{1.5}}$$

$= 2.06(N \cdot m) <$ Rated torque…Satisfactory

9. **Selection result**

The servo motor and servo drive selected temporarily according to preceding steps are available for use. The torque diagram is as follows.

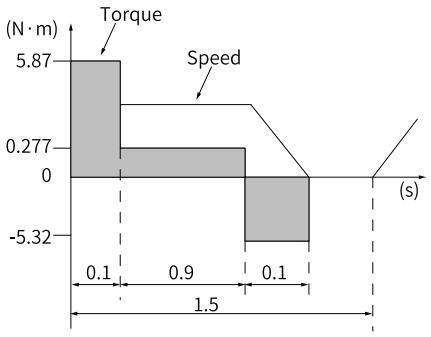


Figure 7-1 Torque diagram

8 Standards Compliance

CCC certification

Product	Standard
High performance explosion-protected servo motor	GB/T 3836.1-2021
	GB/T 3836.2-2021
	GB/T 3836.31-2021

Note

The product meets the requirements of the latest standards of the CCC certification.

China Energy Label

Name	Note
	① The China Energy Label is attached to the motor. You can scan the QR code on the label to get the filing information. ② The motor model only represents one specific model in MS1 series motors. ③ Motor efficiency values ④ Name of the standard: GB30253-2013 (Minimum allowable value of energy efficiency and energy efficiency grades for permanent magnet synchronous motors)
	⑤ Scan the QR code to access China Energy Label website, which shows the main model in the list of filing models. ⑥ Click View More to view the list of other filing models. ⑦ Displays the list of filing models and related efficiency values.

9 Service and Support

Should you encounter a safety accident during the use or operation of the product, or face challenges in operating and maintaining the equipment, which remain unresolved after the relevant documentation is consulted, we provide multiple channels to ensure prompt resolution:

- Channel #1: Contact service@inovance.com.
- Channel #2: Visit https://www.inovance.com/global to access document downloads, after-sales support, spare parts ordering, repair applications, and authenticity verification services.
- Channel #3: Download My Inovance app (https://zshc-eu.inovance.com/download-pc/) where you can access products info and documentation, and query product parameters.

We are committed to providing you with quick and professional technical support, and we look forward to your satisfaction and trust.

10 Appendix

10.1 CCC Certificate



中国国家强制性产品认证证书

证书编号：2024312301007305

认证委托人名称及地址
苏州汇川技术有限公司
江苏省苏州市吴中区天鹅荡路52号
生产者名称及地址
苏州汇川技术有限公司
江苏省苏州市吴中区天鹅荡路52号
生产企业名称及地址
岳阳汇川技术有限公司
中国（湖南）自由贸易试验区岳阳片区长江大道87号
产品名称和系列、型号、规格
高性能防爆伺服电机

见附页

见附页

产品标准和技术要求
GB/T 3836.1-2021, GB/T 3836.2-2021, GB/T 3836.31-2021

上述产品符合《强制性产品认证实施规则 防爆电气》
（CNCA-C23-01：2024）的要求，特发此证。
发证日期：2025年02月21日 有效期至：2029年10月15日

证书信息和有效性可扫描下方二维码或登录发证机构网站查验，
也可在认监委网站（www.cnca.gov.cn）查询。

CNEX

CNAS

法定代表人：

南阳防爆电气研究所有限公司

www.ccc-cnex.com
ccc.china-ex.com

中国河南省南阳市仲景北路20号 邮政编码：473008

0377-63239734
ccc@cn-ex.com

中国国家强制性产品认证证书

证书编号：2024312301007305

证书附页：第 1 页 共 4 页

产品相关信息：

1、本证书覆盖产品如下：

- MS1H4-20B30CB-A334R-EX d T5、MS1H4-20B30CB-A331R-EX d T5

250Hz 以下(恒转矩)、250~500Hz(恒功率)，

MS1H4-40B30CB-A331R-EX d T5、MS1H4-40B30CB-A334R-EX d T5

250Hz 以下(恒转矩)、250~500Hz(恒功率)，

MS1H4-55B30CB-A331R-EX d T5

250Hz 以下(恒转矩)、250~500Hz（恒功率），

MS1H4-75B30CB-A334R-EX d T5、MS1H4-75B30CB-A331R-EX d T5

250Hz 以下(恒转矩)、250~500Hz（恒功率），

MS1H4-90B30CB-A334R-EX d T5、MS1H4-90B30CB-A331R-EX d T5

250Hz 以下(恒转矩)，

MS1H3-85B15CD-A334R-EX d T5、MS1H3-85B15CD-A331R-EX d T5

125Hz 以下(恒转矩)、125~375Hz(恒功率)，

MS1H3-13C15CD-A334R-EX d T5、MS1H3-13C15CD-A331R-EX d T5

125Hz 以下(恒转矩)、125~375Hz（恒功率），

MS1H3-16C15CD-A331R-EX d T5、MS1H3-16C15CD-A334R-EX d T5

125Hz 以下(恒转矩)，

MS1H3-29C15CD-A331R-EX d T5、MS1H3-29C15CD-A334R-EX d T5

125Hz 以下(恒转矩)、125~167Hz(恒功率)，

本页为证书附页，应与证书主页同时使用。

CNEX 南阳防爆电气研究所有限公司 CNAS 中国认可 产品 PRODUCT CNAS C298-P

www.ccc-cnex.com
ccc.china-ex.com

中国河南省南阳市仲景北路20号 邮政编码：473008

0377-63239734
ccc@cn-ex.com



中国国家强制性产品认证证书

证书编号：2024312301007305

证书附页：第 2 页 共 4 页

MS1H3-44C15CD-A331R-EX d T5、MS1H3-44C15CD-A334R-EX d T5

125Hz 以下(恒转矩)，

MS1H3-37C15CD-A334R-EX d T5、MS1H3-37C15CD-A331R-EX d T5

125Hz 以下(恒转矩)、125~150Hz 以下(恒功率)，

MS1H3-45C15CD-A334R-EX d T5、MS1H3-45C15CD-A331R-EX d T5

125Hz 以下(恒转矩)，

额定电压：220V、380V（不同规格额定电压详见使用说明书型号说明）

防爆标志：Ex db IIC T5 Gb，Ex tb IIIC T100℃ Db

MS1H4-20B30CB-T331R-EX d T4、MS1H4-20B30CB-T334R-EX d T4

250Hz 以下(恒转矩)、250~500Hz(恒功率)，

MS1H4-40B30CB-T331R-EX d T4、MS1H4-40B30CB-T334R-EX d T4

250Hz 以下(恒转矩)、250~500Hz（恒功率），

MS1H4-55B30CB-T331R-EX d T4

250Hz 以下(恒转矩)、250~500Hz（恒功率），

MS1H4-75B30CB-T334R-EX d T4、MS1H4-75B30CB-T331R-EX d T4

250Hz 以下(恒转矩)、250~500Hz（恒功率），

MS1H3-85B15CD-T334R-EX d T4、MS1H3-85B15CD-T331R-EX d T4

125Hz 以下(恒转矩)、125~250Hz(恒功率)，

MS1H3-13C15CD-T334R-EX d T4、MS1H3-13C15CD-T331R-EX d T4

125Hz 以下(恒转矩)、125~250Hz（恒功率），

MS1H3-18C15CD-T334R-EX d T4、MS1H3-18C15CD-T331R-EX d T4

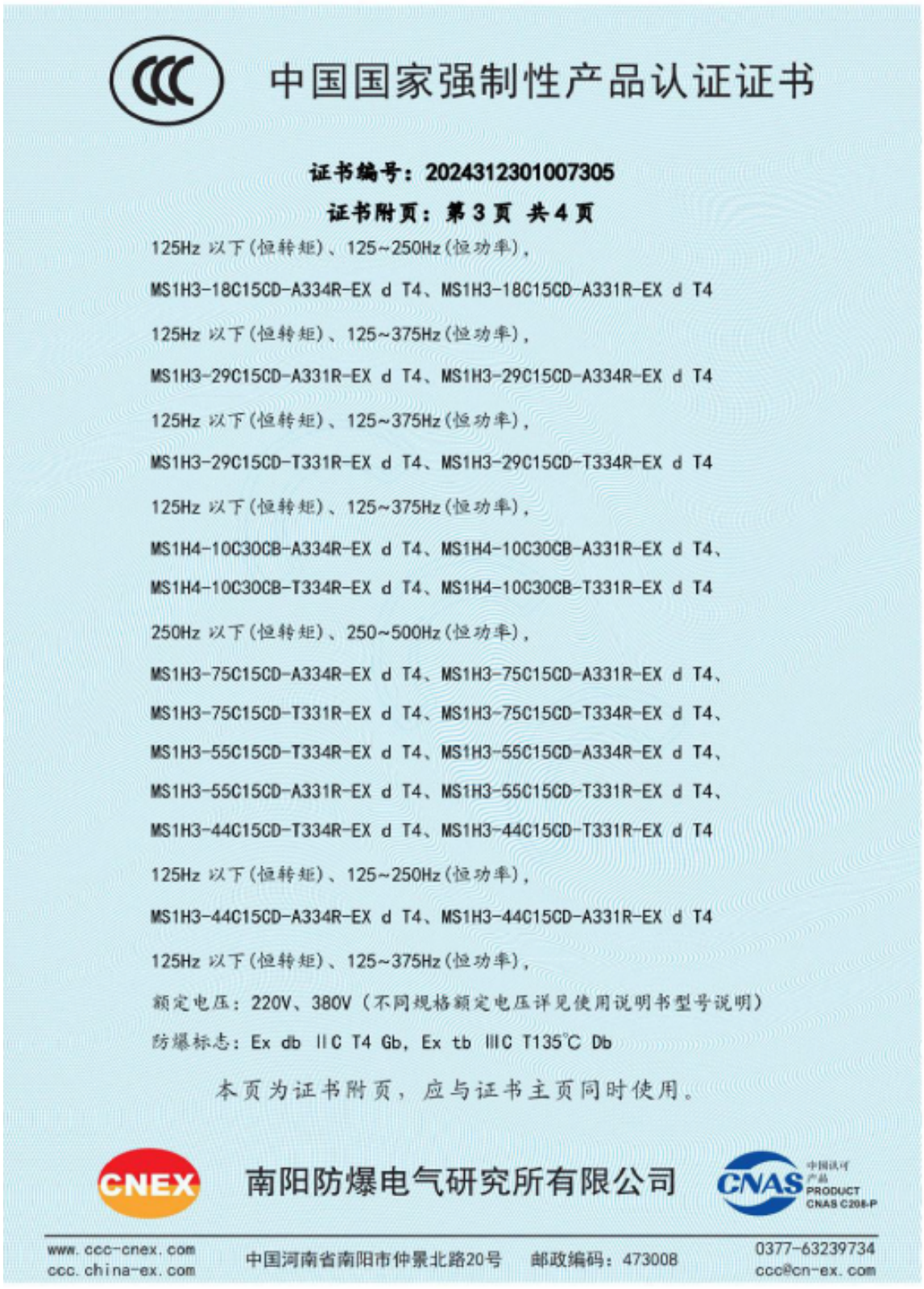
本页为证书附页，应与证书主页同时使用。

南阳防爆电气研究所有限公司

www.ccc-cnex.com
ccc.china-ex.com

中国河南省南阳市仲景北路20号　邮政编码：473008

0377-63239734
ccc@cn-ex.com



中国国家强制性产品认证证书

证书编号：2024312301007305

证书附页：第 3 页 共 4 页

125Hz 以下(恒转矩)、125~250Hz(恒功率)，

MS1H3-18C15CD-A334R-EX d T4、MS1H3-18C15CD-A331R-EX d T4

125Hz 以下(恒转矩)、125~375Hz(恒功率)，

MS1H3-29C15CD-A331R-EX d T4、MS1H3-29C15CD-A334R-EX d T4

125Hz 以下(恒转矩)、125~375Hz(恒功率)，

MS1H3-29C15CD-T331R-EX d T4、MS1H3-29C15CD-T334R-EX d T4

125Hz 以下(恒转矩)、125~375Hz(恒功率)，

MS1H4-10C30CB-A334R-EX d T4、MS1H4-10C30CB-A331R-EX d T4、

MS1H4-10C30CB-T334R-EX d T4、MS1H4-10C30CB-T331R-EX d T4

250Hz 以下(恒转矩)、250~500Hz(恒功率)，

MS1H3-75C15CD-A334R-EX d T4、MS1H3-75C15CD-A331R-EX d T4、

MS1H3-75C15CD-T331R-EX d T4、MS1H3-75C15CD-T334R-EX d T4、

MS1H3-55C15CD-T334R-EX d T4、MS1H3-55C15CD-A334R-EX d T4、

MS1H3-55C15CD-A331R-EX d T4、MS1H3-55C15CD-T331R-EX d T4、

MS1H3-44C15CD-T334R-EX d T4、MS1H3-44C15CD-T331R-EX d T4

125Hz 以下(恒转矩)、125~250Hz(恒功率)，

MS1H3-44C15CD-A334R-EX d T4、MS1H3-44C15CD-A331R-EX d T4

125Hz 以下(恒转矩)、125~375Hz(恒功率)，

额定电压：220V、380V（不同规格额定电压详见使用说明书型号说明）

防爆标志：Ex db IIC T4 Gb，Ex tb IIIC T135℃ Db

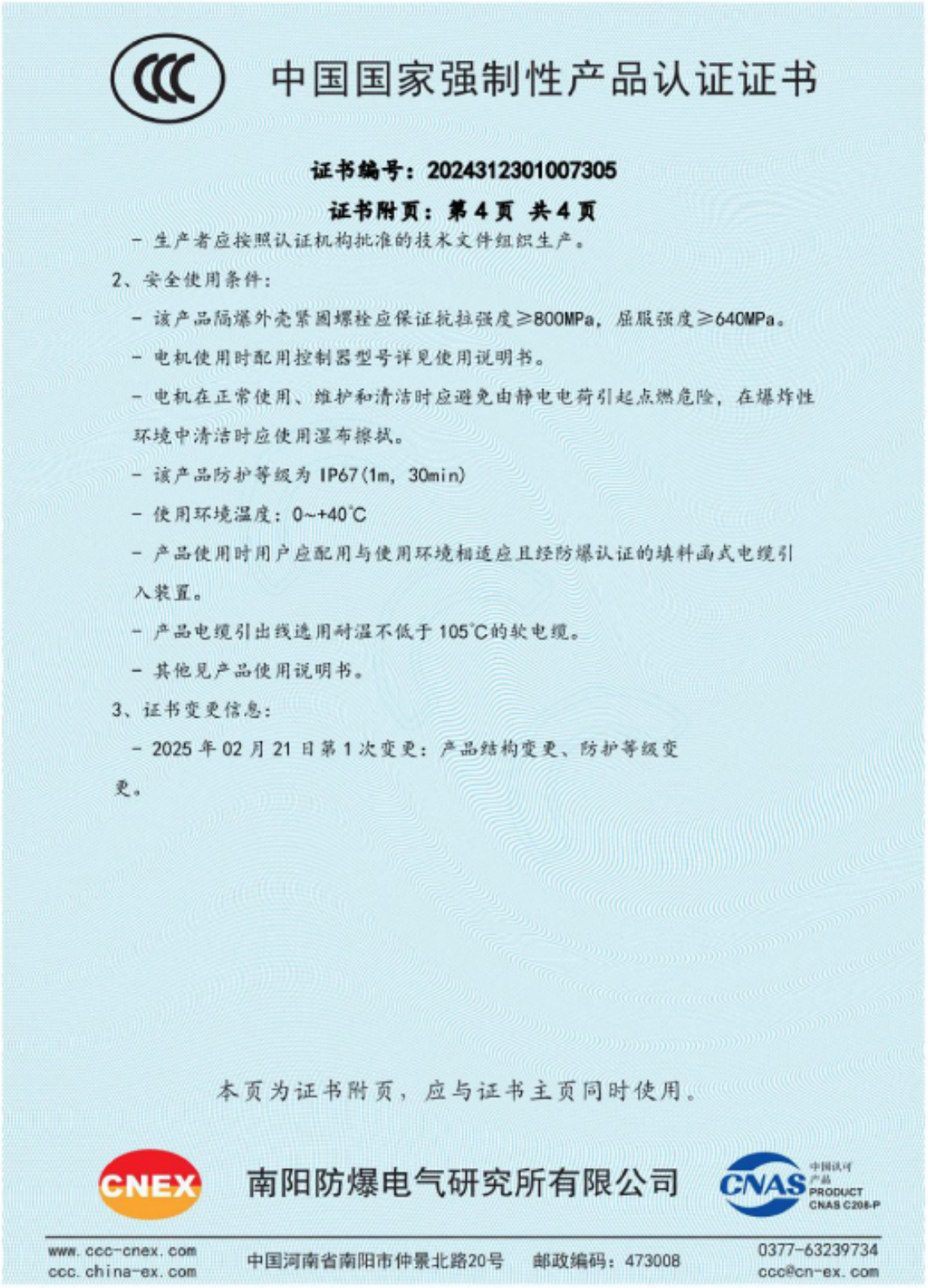
本页为证书附页，应与证书主页同时使用。

南阳防爆电气研究所有限公司

www.ccc-cnex.com
ccc.china-ex.com

中国河南省南阳市仲景北路20号　邮政编码：473008

0377-63239734
ccc@cn-ex.com



中国国家强制性产品认证证书

证书编号：2024312301007305

证书附页：第 4 页 共 4 页

- 生产者应按照认证机构批准的技术文件组织生产。

2、安全使用条件：

- 该产品隔爆外壳紧固螺栓应保证抗拉强度≥800MPa，屈服强度≥640MPa。
- 电机使用时配用控制器型号详见使用说明书。
- 电机在正常使用、维护和清洁时应避免由静电电荷引起点燃危险，在爆炸性环境中清洁时应使用湿布擦拭。
- 该产品防护等级为 IP67(1m，30min)
- 使用环境温度：0~+40℃
- 产品使用时用户应配用与使用环境相适应且经防爆认证的填料函式电缆引入装置。
- 产品电缆引出线选用耐温不低于 105℃的软电缆。
- 其他见产品使用说明书。

3、证书变更信息：

- 2025 年 02 月 21 日第 1 次变更：产品结构变更、防护等级变更。

本页为证书附页，应与证书主页同时使用。

CNEX 南阳防爆电气研究所有限公司 CNAS 中国认可 产品 PRODUCT CNAS C208-P

www.ccc-cnex.com ccc.china-ex.com 中国河南省南阳市仲景北路20号 邮政编码：473008 0377-63239734 ccc@cn-ex.com

10.2 Description of the Motor Enclosure Temperature

The motor surface temperature is a comprehensive indicator of motor application. It is closely related to motor heat generation and heat dissipation. This indicator measures not only the motor

itself but also the installation conditions and ambient temperature. Because of the variety of ambient temperature, the concept of temperature rise is introduced to the GB standards for accurate evaluation on the motor performance, with environmental factors ruled out.

The difference between the temperature of a component of the motor and the temperature of the surrounding medium represents the temperature rise of the component. The enclosure that can be directly touched is the enclosure temperature rise (in K-Kelvin).

Enclosure temperature rise (K) = Enclosure temperature (℃) - Ambient temperature (air, ℃)

Description of motor temperature rise

The motor is used to convert electrical energy to mechanical energy. The conversion efficiency cannot reach 100%. All electromagnetic, mechanical, and other losses during operation are converted to thermal energy. The efficiency values and temperature rise of the motor are different when running under different conditions (torque T and speed n). The temperature rise is an inherent characteristic of the motor.

Main heat generating source

1. Copper loss in the stator winding $p_{cu} = 3I^2R.$
2. Iron loss in the stator iron core $p_{Fe} = K_h f B^{\delta\alpha} + K_c f^2 B^{\delta 2} + K_e f^{1.5} B^{\delta 1.5}$
3. Mechanical windage and friction losses $p_{mec} = k\omega$
4. Brake copper loss $p_{cu} = I^2R$

Heat dissipation source

1. Dimensions of the heatsink area in contact with the motor flange
2. Enclosure material and cooling area of the enclosure
3. Ambient temperature and cooling conditions of the motor (such as whether there is a cover)
4. Altitude of the motor (depending on the atmospheric rarefaction level)

Description of motor temperature resistance

When the motor runs in the rated state for a long time and the temperature reaches a stable level, the allowable temperature rise limit of the motor components is the temperature rise limit. The temperature rise limit of the motor is specified in the "Basic Technical Requirements of the Motor" and "GB-755 2008 Rotary Motor Quota and Performance" (equivalent to IEC 60034-1).



ICS 29.160.01
K 20

中华人民共和国国家标准

GB 755—2008/IEC 60034-1:2004
代替 GB 755—2000

旋转电机　定额和性能

Rotating electrical machines—Rating and performance

(IEC 60034-1:2004,IDT)

The temperature rise limit of air-cooled motors is shown in the following table.

Table 10–1 Temperature rise limit of indirect air-cooled winding (unit: K)

Thermal classification		130 (B)			155 (F)			180 (H)		
Measurement method: Th = Thermometer method; R = Resistance method; ETD = Embedded thermometer method		Th	R	ETD	Th	R	ETD	Th	R	ETD
No.	Motor components									
1c)	AC winding of the motor with output outside item 1d) or 1e)[b] being 200 kW (or kVA) and below	-	80	-	-	105	-	-	125	-
1d)	AC winding[b] of the motor with rated output lower than 600 W (or VA)	-	85	-	-	110	-	-	130	-

Table 10–2 Thermal class of the motor winding

Thermal class mark	Original mark
90	Y
105	A
120	E
130	B
155	F
180	H
200	200
220	220
250	250
If the heat resistance level exceeds 250, mark it in increments of 25.	
Note: The original class C is used for all temperatures above 180℃. It has been replaced by the above thermal class and is no longer valid.	

Description of motor derating

Caution

Select the motor load rate based on the following requirements.

Oil seal

The derating rate ranges from 10% to 20% based on the frame size and friction loss of the oil seal.

Ambient temperature

The motor can run continuously without derating at ambient temperatures between 0℃ and 40℃. For temperatures above 40℃, reduce the load rate during continuous operation to prevent motor overtemperature. See the derating curve in *"4.3 Derating Characteristics" on page 26*.

Altitude

The motor can run continuously without derating at altitudes below 1000 m. For altitudes above 1000 m, reduce the load rate during continuous operation to prevent motor overtemperature. See the derating curve in *"4.3 Derating Characteristics" on page 26*.

Heat dissipation area

When the motor runs without derating, the heatsink dimensions of the motor is shown in *"Table 10-3" on page 94*.

Table 10–3 Dimensions and material of the motor heatsink

Frame size	60	80	130	180
Heatsink dimensions (mm) (W x H x D)	250 x 250 x 6		400 x 400 x 20	500 x 500 x 30
Material	Aluminum		Steel	Steel

Description of motor temperature rise in special applications

1. The motor shaft end is directly connected to the load. The mechanical accuracy on the load end must be high enough. Check the permissible maximum motor temperature required and the application industry.
2. When the motor is easily accessible, such as the conveyor belt in the logistics industry, keep the motor temperature below 50℃.
3. For replacement needs, collect the data of the original motor first before selecting the motor.
4. When the motor is directly connected to the reducer, reduce the derating value properly to prevent motor overtemperature.

Copyright © Shenzhen Inovance Technology Co., Ltd.

PS00014314A01

Shenzhen Inovance Technology Co., Ltd.

www.inovance.com

Add.: Inovance Headquarters Tower, High-tech Industrial Park,
Guanlan Street, Longhua New District,
Shenzhen 518000, P.R. China

Tel: (0755) 2979 9595 Fax: (0755) 2961 9897

Suzhou Inovance Technology Co., Ltd.

www.inovance.com

Add.: No. 52, Tian E Dang Road, Wuzhong District, 215104,
Suzhou City, Jiangsu Province, P.R. China

Tel: (0512) 6637 6666 Fax: (0512) 6285 6720